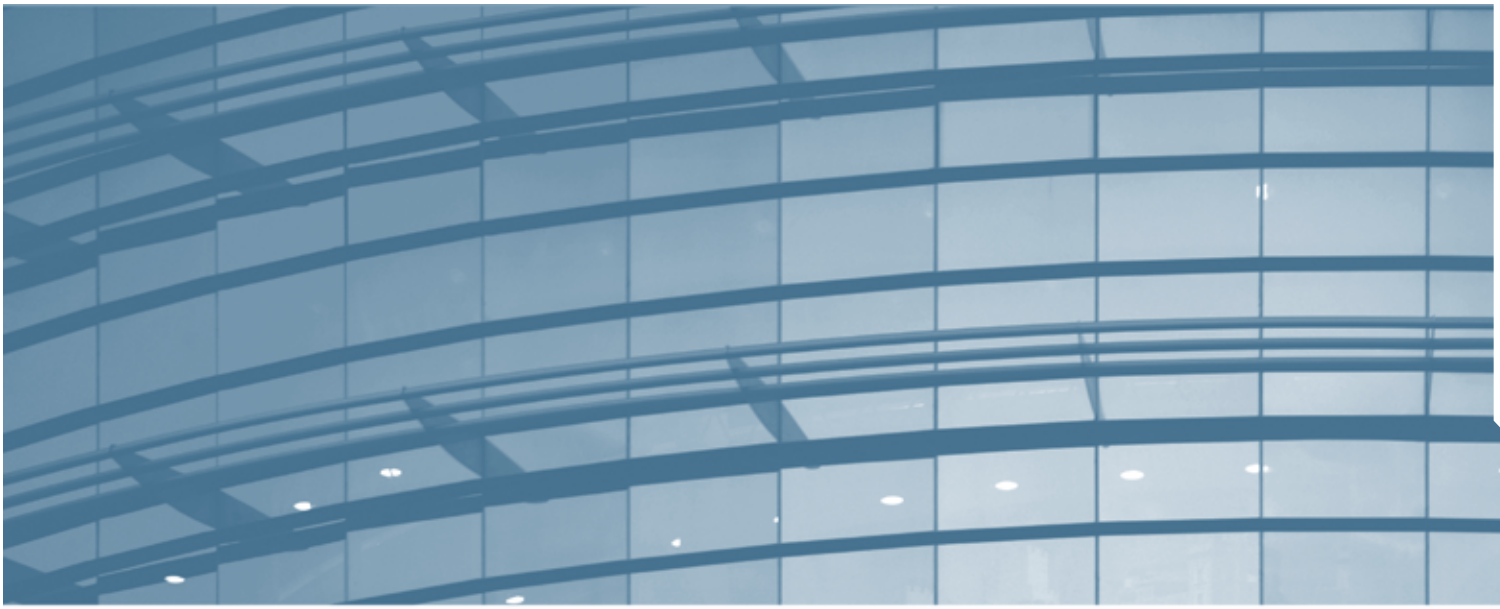
SPECIFICATION CATALOG



ENVISION™

Commercial 0.75 to 6 Ton

Geothermal/Water Source Heat Pump

WaterFurnace®

Smarter from the Ground Up™

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The Envision Series

Nearly 25 years ago WaterFurnace led the way by designing and manufacturing water source heat pumps for use in geothermal closed loop applications. In 2003 WaterFurnace developed the first R410A water source heat pump product line. Now the Envision Series breaks ground again by providing the first 30 EER and 5 COP (ISO 13256-1 GLHP) and the first 20 EER 6 COP (ISO 13256-1 WLHP) rated water-source heat pump on the market. Higher efficiency also means less heat rejected and ultimately shorter earth loops. WaterFurnace quality is well known and respected and is a result of quality engineering and manufacturing in the state of the art Fort Wayne, Indiana plant. The Envision Series provides:

- Highest efficiencies and lowest operating costs.
- Broadest R410A product line.
- Standard or extended range (geothermal) operation.
- Single or Dual Capacity in commercial voltages
- ECM or PSC Fan motor options
- IAQ features.
- Quiet operation.
- Flexible control options.
- WaterFurnace Quality.

Vertical Envision Series

Models NSV 009-070 (3/4-6 tons) Single Speed
Models NDV 026-072 (2-6 tons) Dual Capacity

Horizontal Envision Series

Models NSH 009-070 (3/4-6 tons) Single Speed
Models NDH 026-072 (2-6 tons) Dual Capacity

All Envision Series product is Safety listed under UL1995 thru ETL and performance listed with AHRI in accordance with standard 13256-1. The Envision Series is also Energy Star rated.

The Envision Series

Product Features: Vertical Cabinet

Envision Vertical units are available in two cabinet sizes. The cabinets are designed for high efficiency and maximum flexibility and primary servicing from the front.

Factory mounted filter rack. Field switchable for 1″ or 2″ filters

Oversized rifled tube/lanced fin air coil (Optional FormiShield coating).

Corrosion-resistant, composite drain pan with overflow protection

ThermaShield coated coaxial heat exchanger

Microprocessor Control
PREMIER - Standard
FX10 - Optional

Fault and status LEDs (standard microprocessor controls only)

Powder coated, heavy-gauge steel cabinet

Optional field mounted auxiliary heater with electronic controls (208-230 units with Premier control only)

Insulated divider panel

Optional factory installed water heating system with built-in coil (no factory installed pump)

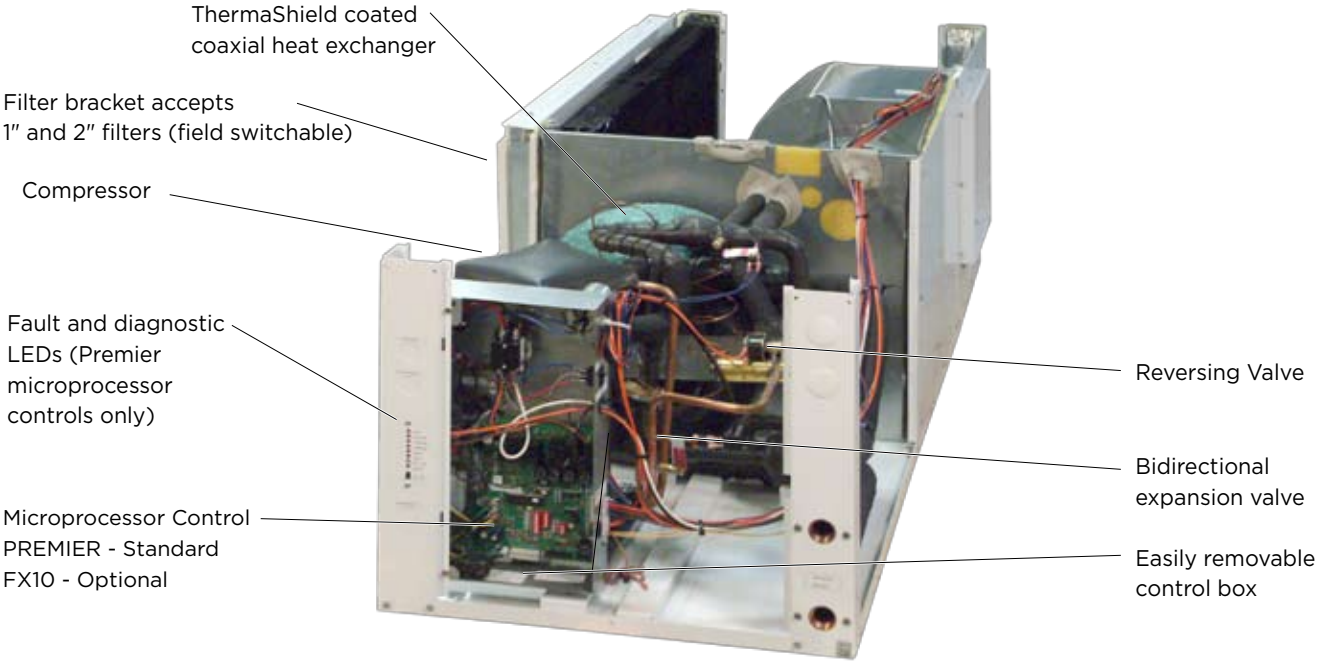
Internally trapped condensate line

A true left and right return option is available.

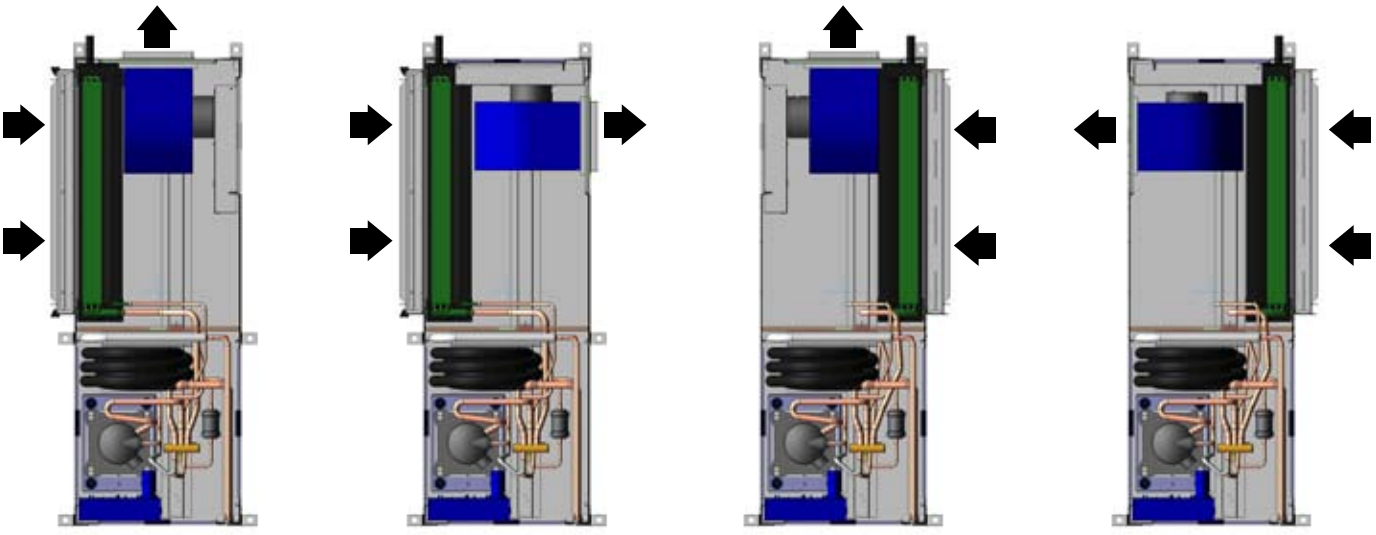
The Envision Series

Product Features: Horizontal Cabinet

Envision Horizontal units are available in four cabinet sizes. The cabinets are designed for high efficiency and maximum flexibility and primary servicing from the front.


ThermaShield coated coaxial heat exchanger
Filter bracket accepts 1" and 2" filters (field switchable)
Compressor
Fault and diagnostic LEDs (Premier microprocessor controls only)
Microprocessor Control
PREMIER - Standard
FX10 - Optional
Reversing Valve
Bidirectional expansion valve
Easily removable control box

Four fan deck options are available. Factory or field conversion option of end or side discharge using switchable access panels and a factory only option of true left or right return air coil.



Left hand return with end discharge

Left hand return with side discharge

Right hand return with end discharge

Right hand return with side discharge

The Envision Series

High Efficiency

Envision Series is the highest efficiency units available. Large oversized air coils, water to refrigerant heat exchangers and single and dual capacity scroll compressors provide extremely efficient operation and produce the first 30 EER and 5 COP (ISO 13256-1 GLHP) water-source heat pump on the market. This efficiency means the Envision Series requires less loop than any product on the market. This can mean significant savings on commercial projects.

Quiet Operation

All Envision Series product is ARI 260 sound rated using third party sound testing. Room Noise Criteria Curves (NC Curve) may be calculated using data from the ARI 260 ratings giving the engineer total flexibility in assuring a quiet environment. Please refer to our separate catalog WaterFurnace Sound Ratings and Performance Catalog concerning this standard and Envision sound performance data.

Standard Features

- Large low rpm blower with either PSC or optional variable speed ECM motors.
- Heavy gauge cabinet and 6 vibration isolating hanger brackets.
- Quiet rotary or scroll compressors in all models
- 2-dimension refrigerant piping vibration loops to isolate the compressor.
- All interior cabinet surfaces including the compressor compartment are insulated with 1/2″ [12.7mm] thick 1-1/2lb [681g] density, surface coated, acoustic type glass fiber insulation.
- Double isolated compressor mounting utilizing eight durometer selected rubber grommets and high density steel.

Super Quiet Option

An optional SuperQuiet Sound Package is also available for a modest cost features:

- Multi-density steel laminate compressor ‘mass’ base plate designed to suppress low frequency compressor noise.

- Multi-density laminate lined compressor blanket designed to completely surround the compressor on all six sides and suppress low frequency noise.

Indoor Air Quality (IAQ)

All Envision Series features several IAQ benefits:

- Corrosion-free plastic double-sloped drain pan to eliminate standing water and prevent bacterial growth
- Foil-faced fibre insulation in all air handler compartments to allow cleanability and inhibit bacteria growth. Optional non-fibrous closed cell insulation is also available for more sensitive applications.
- Filter rack/Duct collar is field switchable from 1″ to 2″ [2.54 to 5.1 cm] for more filter options.
- Standard supplied filter is a pleated MERV 8, 1″ [2.54 cm]. An optional low static high efficiency 2″ [5.1 cm] MERV 13, for LEED certification points, is also available.

Hot Gas Reheat - Dehumidification

With tighter construction and more and more ventilation air coming into buildings, there is more need now than ever for dehumidification. Ensuring dehumidification can provide; consistent employee comfort, a reduction in mold liability, a reduction in cooling costs. Reduced humidity also provides an improvement in indoor air quality (IAQ) thru lower humidity levels which can reduce allergen levels, inhibit mold and bacterial growth, and provide an improved computer environment. Reheat can be used wherever moisture is a problem. In schools, high latent auditoriums and theaters, makeup air units, computer rooms, and indoor swimming pool rooms are typical applications. The option consists of a reheat air coil located after the evaporator air coil and a reclaim valve that diverts the hot gas into the reheat coil. Neutral air will be provided at typical WLHP loop temperature.

The reheat option is only available with the FX10 control. With this control we have three control schemes available:

Room wall dehumidistat – An optional room wall dehumidistat that controls the reheat mode thru a 24VAC ‘Hum’ input (On or Off). Setpoint and deadband is determined by the dehumidistat.

The Envision Series

Duct humidity sensor – An optional duct humidity sensor is installed. The FX10 control reads the humidity from the sensor and determines operation mode. Setpoint and deadband are internally set by the FX10 control and are adjustable. Continuous fan operation is a requirement for this mode to accurately measure relative humidity during the off cycle.

Room wall humidity sensor – An optional wall humidity sensor is installed. The FX10 control reads the humidity from the sensor and determines operation mode. Setpoint and deadband are internally set by the FX10 control and are adjustable. Continuous fan operation is NOT a requirement for this mode.

Hot Gas Bypass

The hot gas bypass (HGB) option is designed to limit the minimum evaporating pressure in the cooling mode to prevent the air coil from icing. The HGB valve senses pressure at the outlet of the evaporator by an external equalizer. If the evaporator pressure decreases to 115 psig the HGB valve will begin to open and bypass hot discharge gas in the inlet of the evaporator. The valve will continue to open as needed until it reaches its maximum capacity. Upon a raising of suction pressure the valve will begin to close back off and normal cooling operation will resume.

Flexible Control Options

The standard Premier microprocessor control board provides complete monitoring and control with fault, status and I/O LED indication for easy servicing. The Premier features a robust microprocessor control that monitors LP, HP, Condensate, field selectable thermistor freeze detection, while providing a flexible accessory relay and fault output scheme.

The optional FX10 control provides unparalleled capability in several areas including performance monitoring, zoning, humidity, energy management, and service diagnosis, and then communicates it all thru standard DDC protocols like N2, Lon and BACnet (MS/TP @ 19,200 Baud rate).

Premier

FX10

The most unique feature is integrating the FX10 into the Envision series as both the heat pump and DDC controller providing both a cost advantage and features not typically found on WLHP controls. This integration allows heat pump monitoring sensors, status and service diagnosis faults to be communicated thru the DDC direct to the building automation system (BAS), giving building supervisors detailed and accurate information on every piece of equipment without removing an access panel!

Easy Maintenance and Service Advantages

- 3 removable compressor access panels
- Separate air handler and compressor section access panels permit service testing without bypass.
- Designed for front panel access.
- LED Fault and status lights (Premier control)
- Removable low voltage connector for easy thermostat wiring.
- Quick attach wiring harnesses are used throughout for fast servicing.
- High and low pressure refrigerant service ports.
- Internal drop out blowers (vertical) and access panel view of all blower motors (horizontal).

Optional user interface for diagnostics & commissioning of FX controls.

Internally Mounted Solenoid Valve Option (Special)

When variable speed circulating pump systems are designed, low pressure drop (high Cv) solenoid valves are specified at each unit to vary the pump according to flow required. It is important that these valves be low pressure drop to avoid unwanted pump watts. This option factory installs this valve inside the unit. This can be ordered only as a special.

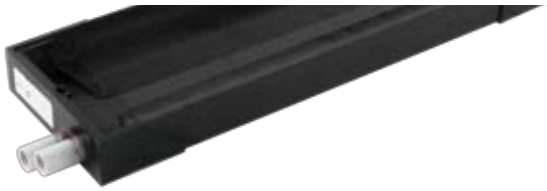
Internally Mounted Pump Option (Special)

When load match or primary/secondary pumping systems are designed, low wattage pumps are specified at each unit to overcome the pressure drop of the unit water heat exchanger and produce the required unit water flow into the primary loop. It is important that these pumps be low wattage to avoid unwanted pump watts. This option factory installs this pump inside the unit complete with operational controls. This can be ordered only as a special.

The Envision Series

Secondary Drain Option (Special)

Some local building authority's interpretation of codes require more condensate overflow protection than standard microprocessor based condensate sensors offer. In these areas a full secondary drain pan might be required causing both increased cost and unit service access issues. In many of these cases a secondary drain option can be added to the unit to pass this local interpretation of condensate drain redundancy. This option adds a second PVC drain connection to the drain pan at a higher level. This can be ordered as a special.



Factory Quality

- All refrigerant brazing is performed in a nitrogen environment.
- Computer controlled deep vacuum and refrigerant charging system.
- All joints are leak detected for maximum leak rate of less than 1/4 oz. per year.
- Computer bar code equipped assembly line insures all components are correct.
- All units are computer run-tested with water to verify both function and performance.

Inside the Envision Series

Refrigerant

Envision products all feature zero ozone depletion and low global warming potential refrigerant R410A.

Cabinet

All units are constructed of corrosion resistant galvanized sheet metal with white polyester powder coat paint rated for more than 1000 hours of salt spray. Three large lift-out access panels provide access to the compressor section from three sides. Refrigerant circuit is designed to allow primary serviceability from the front. 4 horizontal and 2 vertical cabinets are provided for application flexibility. One air handler access panel allows servicing of the fan motor, blower, and drain pan. The fan motor and blower can be completely serviced or replaced without removal of the unit.

Flexible configurations include 4 fan deck options for horizontals and a true left and right return on both horizontal and vertical.

Filter Rack

Filter rack/duct collar is field switchable between 1 in. [2.5 cm] and 2 in. [5.1 cm] thick filters for filter flexibility. A MERV 8, 1 in. [2.54 cm] is standard with an optional 2 in. [5.1 cm] MERV 13 for LEED certification points and high efficiency filtration.

Electrical Box

Unit controls feature quick connect wiring harnesses for easy servicing. Separate knockouts for LV, and two for power on two sides allow easy access to the control box. Large 75VA transformer assures adequate controls power for accessories.

Water Connections

Flush mount FPT water connection fittings allow one wrench leak-free connections and do not require a backup wrench.

Horizontal Hanger Kits

Each horizontal unit includes a hanger kit (four hanger points for 009-030 models; six points for 036-072 models) to meet seismic specification requirements while still allowing filter access.

Drain Pan

All condensate connections are pvc glue for economical corrosion free connections. Bacteria resistant composite drain pan is sloped to promote complete drainage and will never rust or corrode. Complete drainage helps to inhibit bacterial or microbial growth. Vertical units feature an internally trapped condensate line using clear pvc hose for easy inspection and reduced installation cost.

Inside the Envision Series

Compressors

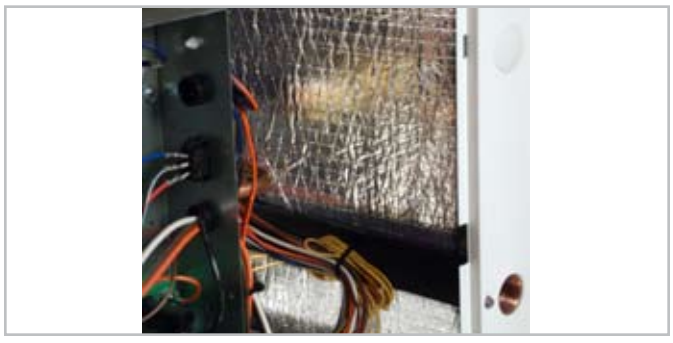
High efficiency R410A rotary or scroll compressors are used on every model. Rotary or scrolls provide both the highest efficiency available and great reliability. Both single speed and dual capacity models are available in commercial voltages.

Compressor Dual Isolation Mounting

Double isolated compressor mounting utilizing eight durometer selected rubber grommets and high density steel. This isolation greatly reduces the primary noise frequency range of 100-300 Hz.

Air Handler Insulation

Foil Faced air handler insulation provides cleanability to further enhance IAQ.



Thermostatic Expansion Valve

All Envision models utilize a balanced port bidirectional thermostatic expansion valve (TXV) for refrigerant metering. This allows precise refrigerant flow in a wide range of entering water variation (20 to 120°F [-7 to 49 °C]) found in geothermal systems. The TXV is located in the compressor compartment for easy access.

Water-to-Refrigerant Coaxial Heat Exchanger Coil

Large oversized coaxial refrigerant to water heat exchangers provide unparalleled efficiency. The coaxes are designed for low pressure drop and low flow rates. All coaxes are pressure rated to 450 psi water side and 600 psi on the refrigerant side. Optional ThermaShield coating is available on the water-to-refrigerant heat exchanger to prevent condensation in low temperature loop operation.

Service Connections and Serviceability

Two Schrader service ports are provided in every unit. The suction side and discharge side ports are for field charging and servicing access. All valves are 7/16″ SAE connections. All water and electrical connections are made from the front of the unit. Unit is designed for front access serviceability.

Inside the Envision Series

4-Way Reversing Valve

Envision units feature a reliable all-brass pilot operated refrigerant reversing valve. The reversing valve operation is limited to change of mode by the control to enhance reliability.

Air Coil

Large low velocity air coils are constructed of lanced fin and riffled tube. Each model features 3 rows for added moisture removal (4 rows on 070-072). An optional FormiShield™ air coil coating is available to further inhibit formicary corrosion.

Blower Motor and Housing

High efficiency low rpm galvanized direct drive blower featuring 3 speed permanently split capacitor (PSC) motor and optional variable Speed ECM fan motor. The ECM motor is controlled directly through the units microprocessor control. The lower rpm blower also reduces air noise. All PSC motors have speed selection terminal strip on the motor for easy speed change. All motors are vibration isolated to reduce noise. High static options are available in most models for both PSC and ECM motor versions. Horizontal units can be field converted from end to side discharge as well.

IntelliStart

The optional IntelliStart single phase soft starter will reduce the normal start current (LRA) by 60-70%. This allows the heat pump to go off-grid. Using IntelliStart also provides a substantial reduction in light flicker, reduces start-up noise, and improves the compressor's start behavior. IntelliStart is available in a field retrofit kit or as a factory installed option for all Envision and Synergy3D units.

Envision Controls

Premier Control

The standard Premier microprocessor control board provides complete monitoring and control with fault, status and I/O LED indication for easy servicing. The Premier features a robust microprocessor control that monitors LP, HP, Condensate, field selectable thermistor freeze detection, while providing a flexible accessory relay and fault output scheme.

FX10 Control

The optional FX10 control provides unparalleled capability in several areas including performance monitoring, zoning, humidity, energy management, and service diagnosis, and then communicates it all thru standard DDC protocols like N2, Lon and BACnet (MS/TP @ 19,200 Baud rate).

The most unique feature is integrating the FX10 into the Envision series as both the heat pump and DDC controller providing both a cost advantage and providing features not typically found on WLHP controls. This integration allows heat pump monitoring sensors, status and service diagnosis faults to be communicated thru the DDC direct to the building automation system (BAS), giving building supervisors detailed and accurate information on every piece of equipment without removing an access panel!

Control	General Description	Application	Display/Interface	Protocol
Premier Control	The Premier microprocessor control is self contained control featuring LP, HP, LWT, and condensate overflow fault modes that are displayed on an 8 LED fault board. Multiple DIP switches allow several field configurations. This control is suited for both single and dual capacity compressors as well as PSC and ECM fan motors. Both loop and desuperheater pumps are controlled. Input and outputs can be viewed on LED board. Connec ions for thermostat are made through a removeable 8 pin connector.	Residential and commercial applications using single and dual capacity compressors with either PSC or ECM fan motors. Includes integral residential loop pump control but cannot be integrated with centralized building automation systems (BAS).	8 LED Fault/Mode Display Board On side of unit is standard	Standalone
FX10	The FX10 microprocessor control is self contained control featuring LP, LOC, HP, LWT, and condensate overflow fault modes can be displayed on BAS system. Optional handheld Medium User Interface (MUI) Control can be used for additional setup or servicing. Program customization is possible. This control is suited for both single and dual capacity compressors as well as PSC and ECM fan motors.	Commercial applications using single and dual capacity compressors with either PSC or ECM fan motors. Also suitable for multi-compressor products. Cannot be integrated with centralized building automation systems. Software can be customized for specific projects.	Optional Medium User Interface (MUI) can be used as a field service tool.	Standalone
FX10 w/N2	FX10 Control functions as both unitary heat pump control and DDC communication, therefore detail operational and fault information is available to BAS. Other features are same as FX10 wi h addition of Johnson Controls N2 compatibility.	Same as FX10 with Johnson Controls N2 BAS compatibility.	Optional Medium User Interface (MUI) can be used as a field service tool.	Johnson Controls N2 network
FX10 w/LonWorks	FX10 Control functions as both unitary heat pump control and DDC communication, therefore detail operational and fault information is available to BAS. Other features are same as FX10 wi h addition of LonWorks compatibility.	Same as FX10 with LonWorks BAS compatibility.	Optional Medium User Interface (MUI) can be used as a field service tool.	LonWorks
FX10 w/BACnet	FX10 Control functions as both unitary heat pump control and DDC communication, therefore detail operational and fault information is available to BAS. Other features are same as FX10 wi h addition of BACnet compa ibility.	Same as FX10 with BACnet BAS compatibility. Due to communication speed, no more than 40 units should be connected to a single trunk of the network.	Optional Medium User Interface (MUI) can be mounted or used as field service tool.	BACnet - MS/TP (19,200 Baud Rate)

Envision Controls - Premier

Standard Premier Microprocessor

The Premier control system is a microprocessor-based printed circuit board conveniently located in the unit control box for accessibility. The microprocessor control is specifically designed for the Envision Series heat pumps and integrate single speed and dual capacity compressors, variable speed ECM fan motors and advanced features needed in geothermal applications. All ECM airflow selections are conveniently configured on the control via DIP switches. The microprocessor provides control of the entire unit as well as outputs for status modes, faults, and diagnostics. Removable low voltage thermostat terminal strips provide convenient field connections. LEDs are located on the front of the cabinet for quick inspection without removing any access panels.

Startup

The unit will not operate until all the inputs and safety controls are checked for normal conditions. At first power-up, a four minute delay is employed before the compressor is energized.

Component Sequencing Delays

Components are sequenced and delayed for optimum space conditioning performance.

Accessory Relay

An accessory relay on the control board allows for field connection of solenoid valves, electronic air cleaners, etc. The accessory relay has a normally open output and a normally closed output.

Short Cycle Protection

The control employs a minimum “off” time of four minutes to provide for short cycle protection of the compressor.

Condensate Overflow Protection

The Envision control board incorporates an impedance sensing liquid sensor at the top of the drain pan. Upon a continuous 30-second sensing of the condensate, compressor operation is suspended (see Fault Retry), and the condensate overflow lockout LED begins flashing.

Shutdown Mode

A 24VAC common signal to the “shutdown” input on the control board puts the unit into shutdown mode. Compressor, hot water pump and fan operation are suspended.

Safety Controls

The Envision control receives separate signals for a high pressure switch for safety, a low pressure switch to prevent loss of charge damage, and a low suction temperature thermistor for freeze sensing. Upon a continuous 30-second measurement of the fault (immediate for high pressure), compressor operation is suspended, the appropriate lockout LED begins flashing. (Refer to the “Fault Retry” section below).

Testing

The Envision control allows service personnel to shorten most timing delays for faster diagnostics.

Fault Retry

All faults (except for low RPM faults with the ECM2 fan motor) are retried twice before finally locking the unit out. An output signal is made available for a fault LED at the thermostat. The “fault retry” feature is designed to prevent nuisance service calls.

Diagnostics

The Envision control board allows all inputs and outputs to be displayed on the LEDs for fast and simple control board diagnosis.

Resistance Heat Control (208-230 Units)

The electric heat control module contains the appropriate high-voltage control relays. Control signals energize the relays in the proper sequence, and the LED display board indicates which stages are energized.

Heating Operation

Heat, 1st Stage (Y1)

The fan motor is started on low speed immediately (PSC ON), the loop pump is energized 5 seconds after the “Y1” input is received, and the compressor is energized on low capacity 10 seconds after the “Y1” input. The fan is switched to medium speed 15 seconds after “Y1” input (ECM only).

Envision Controls - Premier

Heat, 2nd Stage (Y1,Y2) Single-Speed Units

Fan changes to high speed 15 seconds after the "Y2" input (ECM only).

Heat, 2nd Stage (Y1,Y2) Dual Capacity Units

The second stage compressor will be activated 5 seconds after receiving a "Y2" input as long as the minimum first stage compressor run time of 1 minute has expired. The ECM blower changes from medium to high speed 15 seconds after the "Y2" input.

The Comfort Alert will delay the second stage compressor until 5 seconds after it receives a "Y2" from the board.

Heat, 3rd Stage (Y1,Y2,W) Single-Speed Units

The first stage of resistance heat is energized 10 seconds after "W" input, and with continuous 3rd stage demand, the additional stages of resistance heat engage sequentially every 5 minutes.

Heat, 3rd Stage (Y1,Y2,W) Dual Capacity Units

The 1st stage of resistance heat is energized 10 seconds after "W" input, and with continuous 3rd stage demand, the additional stages of resistance heat engage sequentially every 5 minutes.

Emergency Heat (W only)

The fan is started on high speed, and the first stage of resistance heat is energized 10 seconds after the "W" input. Continuing demand will engage the additional stages of resistance heat sequentially every 2 minutes.

Cooling Operation

In all cooling operations, the reversing valve directly tracks the "O" input. Thus, anytime the "O" input is present, the reversing valve will be energized.

Cool, 1st Stage (Y1,O)

The blower motor and hot water pump are started immediately, the loop pump(s) is energized 5 seconds after the "Y1" input is received. The compressor will be energized (on low capacity for Dual Capacity units) 10 seconds after the "Y1" input. The ECM blower will shift from low to medium speed 15 seconds after the "Y1" input (85% of medium speed if in dehumidification mode).

Cool, 2nd Stage (Y1, Y2, O) Single Speed Units

The fan changes to high speed (85% of high speed if in dehumidification mode) 15 seconds after the "Y2" input (ECM only).

Cool, 2nd Stage (Y1, Y2, O) Dual Capacity Units

The second stage compressor will be activated 5 seconds after receiving a "Y2" input as long as the minimum first stage compressor run time of 1 minute has expired. The ECM blower changes to high speed 15 seconds after the "Y2" input. (85% of high speed if in dehumidification mode). The Comfort Alert will delay the second stage compressor until 5 seconds after it receives a "Y2" from the board.

Fan (G only)

The fan starts on low speed (PSC ON). Regardless of fan input "G" from thermostat, the fan will remain on low speed for 30 seconds at the end of each heating, cooling or emergency heat cycle.

A DIP switch on the Envision control allows field selection of 15% reduced fan speeds for cooling in the dehumidification mode or medium and high fan speeds for cooling in the normal mode.

Note: Fan speed can change automatically only with an ECM Motor.

ECM2 Airflow Selection DIP Switches (SW1)

A 12-position DIP switch package on the Envision control allows the airflow levels to be set for low, medium and high speed. (Refer to Fan Performance Data - ECM Motor). Only three of the DIP switches can be in the "on" position. The first "on" switch (the lowest position number) determines the "low speed fan" setting. The second "on" switch determines the "medium speed fan" setting, and the third "on" switch determines the "high speed fan" setting.

Lockout Conditions

During lockout mode, the appropriate unit and thermostat lockout LEDs will illuminate. The compressor, loop pump, hot water pump, and accessory outputs are de-energized. Unless the lockout is caused by an ECM2 low RPM fault, the fan will continue to run on low speed. If the thermostat calls for heating, emergency heat operation will occur.

Comfort Alert lockouts cannot be reset at the thermostat. All other lockout modes can be reset at the thermostat after turning the unit off, then on, which restores normal operation but keeps the unit lockout LED illuminated. Interruption of power to the unit will reset a lockout without a waiting period and clear all lockout LEDs.

High Pressure

This lockout mode occurs when the normally closed safety switch is opened momentarily (set at 600 PSI).

Envision Controls - Premier

DIP Switch Settings

Prior to powering unit, ensure that all DIP switches on SW2 & SW3 are set properly according to the tables below.

FACTORY SETUP DIP SWITCHES (SW3)				
DIP SWITCH NUMBER		**DESCRIPTION**	**OFF POSITION**	**ON POSITION**
SW 3-	**1**	**Dual Capacity/Single-Speed** Configures the control for single speed compressor operation or dual capacity operation.	Dual Capacity Operation	Single Speed Operation
SW 3-	**2**	**Zoned/Finish on Second Stage** This switch allows the unit to down stage with the thermostat when off and finish with second stage when on. Finish on second stage reduces stage changing in reciprocating dual capacity compressors.	Normal All Other Systems	Finish on 2nd Unzoned Dual Capacity E Series or Premier 2 Speed
SW 3-	**3**	**No RPM/RPM** Configures the control to monitor the RPM output of an ECM/ECM2 blower motor. When using IntelliZone or a PSC fan motor, the control should be configured for "NO RPM" sensing.	PSC Fan/RPM Monitoring Disabled	ECM ECM2 Fan/RPM Monitoring Enabled
SW 3-	**4**	**Electric heat and ECM2** Allows backward compatibility with older P Series. In the Off position this switch allows older electric heat board (17P501A01) and older ECM (square end) compat ibility. On is for all newer EH board (17P514A01) and ECM2 (round end).	Old EH & Old ECM	Normal
SW 3-	**5**	On dual capacity units this switch allows stage change: on the fly when off, and 1 minute delay when on. A delay is required on all reciprocating dual capacity units.	Envision	E Series or P Series

FACTORY SETUP DIP SWITCHES (SW3)				
DIP SWITCH NUMBER		**DESCRIPTION**	**OFF POSITION**	**ON POSITION**
SW 2-	**1**	**Service Test Mode** On the control, allows field selection of "NORMAL" or "TEST" operational modes. Test mode accelerates most timing functions 16 times to allow faster troubleshooting. Test mode also allows viewing the "CURRENT" status of the fault inputs on the LED display.	Test Mode	Normal Speed Operation
SW 2-	**2**	**Freeze Detection Sensing** This DIP switch allows field selection of low source water thermistor fault sensing for well water (30°F) or antifreeze protected (15°F) earth loops.	Loop Water Freeze Detection 15° F	Well Water Freeze Detection 30° F
SW 2-	**3**	**Accessory Relay** Allows field selection of the accessory relay to operate with the compressor or fan.	Acc Relay Tracks Fan	Acc Relay Tracks Compressor
SW 2-	**4**	**Fan Speed Control** Allows field selection of reduced fan speed (85% of selected medium and high speed ECM only) for cooling in the dehumidification mode.	Dehumidification Fan Speeds	Normal Fan Speeds
SW 2-	**5**	**Auxiliary Off** Disables 3rd stage Heating. Full emergency heat would still be available if needed.	Disable Heating Stage 3	Enable Heating Stage 3
SW 2-	**6**	**Diagnostics Inputs** Allows viewing the inputs from the thermostat to the control board such as Y1, Y2, O, G, W, SL1 In on the LED display.	Diagnostic Inputs Viewed at LEDs	Normal Display Viewed at LEDs
SW 2-	**7**	**Diagnostics Outputs** Allows viewing the outputs from the control board such as compressor, reversing valve, blower, hot water pump, and loop pump on the LED display.	Diagnostic Outputs Viewed at LEDs	Normal Display Viewed at LEDs
SW 2-	**8**	**Thermostat Selection** Configures the control for a pulsed lockout signal (ComforTalk and FaultFlash thermostats) or continuous 5 VAC lockout signal.	Pulsed "L" signal	Continuous "L" signal

Envision Controls - Premier

Low Pressure

This lockout mode occurs when the normally closed low pressure switch is opened for 30 continuous seconds (set at 40 PSI). A low pressure fault may also be indicated when a Comfort Alert lockout has occurred.

Freeze Detection (Water Flow)

This lockout mode occurs when the freeze thermistor temperature is at or below the selected freeze sensing point (well 30°F or loop 15°F) for 30 continuous seconds.

Condensate Overflow

This lockout mode occurs when the condensate overflow level has been reached for 30 continuous seconds.

Fan RPM

The control board monitors fan RPM to sense operation. This lockout mode occurs if the fan RPM falls below the low RPM limit (100 RPM) for 30 continuous seconds (ECM only).

Operation Logic Data Table

OPERATION LOGIC	HEATING				COOLING		FAN ON	SL1 - IN ON
	STG1	STG2	STG3	EMERG	STG1	STG2		
SINGLE SPEED UNITS								
Compressor	On	On	On	Off	On	On	-	-
ECM2 Normal	Med	High	High	High	Med	High	Low	-
ECM2 Dehumidify	Med	High	High	High	85% Med	85% High	Low	-
PSC	On	On	On	On	On	On	On	-
Rev Valve	Off	Off	Off	Off	On	On	-	-
Loop Pump	On	On	On	Off	On	On	-	On
Aux Heater	Off	Off	Staged	Staged	Off	Off	-	-
Secondary 1- Out	On	On	On	Off	On	On	-	-
Emerg LED	Off	Off	Off	On	Off	Off	Off	-
T-Stat Signal	Y1	Y1, Y2	Y1, Y2, W	W	Y1, O	Y1, Y2, O	G	-
DUAL CAPACITY UNITS								
Compressor-Lo	On	Off	Off	Off	On	Off	-	-
Compressor-Hi	Off	On	On	Off	Off	On	-	-
ECM2 Normal	Med	High	High	High	Med	High	Low	-
ECM2 Dehumidify	Med	High	High	High	85% Med	85% High	Low	-
Rev Valve	Off	Off	Off	Off	On	On	-	-
Loop Pumps	On	On	On	Off	On	On	-	On
Aux Heater	Off	Off	Staged	Staged	Off	Off	-	-
Secondary 1- Out	On	On	On	Off	On	On	-	-
Secondary 2- Out	Off	On	On	Off	Off	On	-	-
Emerg LED	Off	Off	Off	On	Off	Off	-	-
T-Stat Signal	Y1	Y1, Y2	Y1, Y2, W	W	Y1, O	Y1, Y2, O	G	-

Envision Controls - Premier

Thermostat Displays

Fault Flash

When using a TA32W01 or TP32W02 thermostat and SW2-8 is in the pulsing “L” position, FaultFlash will enable a user to view the thermostat and count the fault indicator flashes to determine the lockout condition the unit is experiencing.

ComforTalk

When using a TP32U03, 04 or 05 thermostat and SW2-8 is in the pulsing “L” position, ComforTalk will enable the user to view the thermostat and determine the fault. The thermostat can be configured to show either lockout text or lockout codes.

The LED board on the front of the unit will display all lockouts. The Low Pressure LED will flash for a low pressure condition or a Comfort Alert fault. If the low pressure lockout was caused by Comfort Alert codes 4, 6 or 7, then the Comfort Alert will be flashing. If no Comfort Alert code is visible, then it is a low pressure lockout.

The following tables show the codes that will be displayed on the different ComforTalk and FaultFlash thermostats.

FaultFlash Thermostats

TA32W01 and TP32W02 Thermostats	
Thermostat Display Lockout Code	Lockout Description
2 Flashes	High Pressure Fault
3 Flashes	Low Pressure Fault
4 Flashes	Not Applicable
5 Flashes	Water Flow Fault
6 Flashes	Not Applicable
7 Flashes	Condensate Fault
8 Flashes	Voltage out of Range
9 Flashes	RPM Fault
10 Flashes	Comfort Alert Compressor Module Fault

Lockout code 10 - see Comfort Alert module to determine the specific flash code for compressor abnormalities.

ComforTalk Thermostats

TP32U03, TP32U04 and TP32U05 Thermostats	
Thermostat Display Lockout Code	Lockout Description
"High Pressure" or "E2"	High Pressure Fault
"Low Pressure" or "E3"	Low Pressure Fault
"E4"	Not Applicable
"Water Flow" or "E5"	Water Flow Fault
"E6"	Not Applicable
"Condensate" or "E7"	Condensate Fault
"Voltage Range" or "E8"	Voltage out of Range
"RPM" or "E9"	RPM Fault
"Comfort Alert" or "E10"	Comfort Alert Compressor Module Fault

These thermostats can be configured to display the lockout condition "text" or error number.

* A slow flash of 1 second on and off means the heat pump microprocessor SW2-1 is configured for "Test Mode" or thermostat is miswired.

Lockout code 10 - see Comfort Alert module to determine the specific flash code for compressor abnormalities.

FX10 Controller (optional)

FX10 Advanced Control Overview

The Johnson Controls FX10 board is specifically designed for commercial heat pumps and provides control of the entire unit as well as input ports for Open N2, LonTalk, BACnet (MS/TP @ 19,200 Baud rate) communication protocols as well as an input port for a user interface. The user interface is an accessory item that can be used to aid in diagnostics and unit setup. A 16-pin low voltage terminal board provides terminals for common field connections. The FX10 Control provides:

- Operational sequencing
- High and low-pressure switch monitoring
- General lockout
- Freeze Detection
- Condensate overflow sensing
- Lockout mode control
- Emergency shutdown mode
- Random start and short cycle protection

Short Cycle Protection

Allows a minimum compressor "off" time of four minutes and a minimum "on" time of two minutes.

Random Start

A delay of 1 to 120 seconds is generated after each power-up to prevent simultaneous startup of all units within a building after the release from an unoccupied cycle or power loss.

Emergency Shutdown

A field-applied dry contact can be used to place the control into emergency shutdown mode. During this mode, all outputs on the board are disabled.

Freeze Detection

Field selectable for 15° or 30°F (-9° or -1°C)

Installation Options

- Standalone controlled by standard room thermostat
- Standalone with a Zone Temperature Sensor (must have user interface to change set points beyond the allowed +/- 5°F)
- Integrated into BAS by adding communication module

Accessory Outputs

Quantity 2. One cycled with fan, other with compressor.

User Interface

4 x 20 backlit LCD.

Main FX 10 Board

Optional Plug-in Communication Modules - (compatible with standard BAS protocols)

- Open N2
- LonTalk
- BACnet (MS/TP @ 19,200 Baud rate)

Display

Requires DLI Card/Kit. Up to 2 displays, either 1 local and 1 remote, or 2 remote. (A 2-display configuration requires identical displays.) Local display can be up to 3 meters from the controller, power supply, and data communication. Remote display can be up to 300 meters from the controller. Remote display must be independently powered with data communication done via 3 pole shielded cable.

Control Timing & Fault Recognition Delays

Lead compressor "ON" delay (not applicable for single compressor models)	90 seconds
Minimum compressor "ON" time (except for fault condition)	2 minutes
Short cycle delay	5 minutes
Random start delay	0-120 seconds
High pressure fault	<1 second
Low pressure fault	30 seconds
Freeze Detection fault	30 seconds
Condensate overflow fault	30 seconds
Low pressure fault bypass	2 minutes
Freeze sensing fault bypass	2 minutes

Notes: Refer to Submittal Data SD1981, Application Guide AGFX10, or BACnet Protocol Implementation Conformance Statement for more information.

Envision Controls - FX10

Optional FX10 Microprocessor and BAS Interface

The FX10 is a microprocessor based control that not only monitors and controls the heat pump but also can communicate any of this information back to the building automation system (BAS). This means that not only does the control monitor the heat pump at the unit you can also monitor and control many the features over the BAS. This clearly puts the FX10 in a class of its own.

The control will enumerate all fault conditions (HP, LP, CO, LOC, and Freeze Detection) over a BAS as well as display them on a medium user interface (MUI). HP, LP, CO and Freeze Detection faults can all be reset over a BAS. A Loss Of Charge fault can not be reset or bypassed until the problem has been corrected. A MUI is invaluable as a service tool for the building service team.

The unit can be commanded to run by a typical heat pump thermostat or run based on heating and cooling set points supplied by a BAS. The control board is wired with quick connect harnesses for easy field change out of a bad control board. All ECM variable fan speed settings can be changed over a BAS or with a MUI. The control has an input programmed to enable field installed emergency heat in the event that the compressor is locked out. This input can also be commanded on from a BAS as needed. An alarm history can be viewed through the MUI and will be held in memory until the unit is power cycled. Relative humidity can be read by a 0-5VDC humidity sensor that is displayed over the network. If you are using an ECM fan motor the control can enable dehumidification mode based on a set point in the control. The dehumidification set point itself can also be changed over a BAS or with a MUI. Dehumidification mode can also be enabled by the BAS. Because the FX10 is not factory configured to read CO^2 levels, contact the factory for application assistance.

The FX10 control has unused analog and digital inputs for field installed items such as air temperature, water temperature, CO^2 or current status switches. The control has unused binary and PWM outputs that can be commanded over the BAS for field use.
An optional Medium User Interface (MUI) for control setup and advanced diagnostics is available with some mounting kits, MUIK1 - Panel mount version and the MUIK2-Wall mount version.

Zone Sensors

There are two options for zone sensors that can be used with the FX10 control. Both sensors use a Johnson controls A99 positive temperature coefficient type sensor. The TAXXJ02 has a set point adjustment now which will give the end user a +/- 5°F adjustment from the set point as well as a push button that can be used for temporary occupancy. The control leaves the factory set to operate with a TAXXJ02 sensor and can be changed to read the TAXXA01 sensor through a building automation system or with a user interface.

Standard Features

- Anti Short Cycle
- High Pressure Protection
- Low Pressure Protection
- Freeze Detection
- Loss Of Charge Detection
- Random Start
- Display for diagnostics
- Reset Lockout at disconnect or through BAS
- 2 Accessory outputs
- Optional BAS add-on controls

DDC Operation & Connection

Other optional network protocol boards that can be added to the FX10 are:

- Johnson Control N2
- LonWorks
- BACnet
  - MS/TP @ 19,200 Baud rate
  - Limit devices to 40 on a single trunk line.

Control and Safety Feature Details

Emergency Shutdown

The emergency shutdown mode can be activated by a command from a facility management system or a closed contact on BI-2. The default state for the emergency shutdown data point is off. When the emergency shutdown mode is activated, all outputs will be turned off immediately and will remain off until the emergency shutdown mode is de-activated. The first time the compressor starts after the emergency shutdown mode has been de-activated, there will be a random start delay present.

Envision Controls - FX10

Lockout Mode

Lockout mode can be activated by any of the following fault signals: refrigerant system high pressure, refrigerant system low pressure, freeze detection, and condensate overflow. When any valid fault signal remains continuously active for the length of its recognition delay, the controller will go into fault retry mode, which will turn off the compressor. After the Compressor short cycle delay, the compressor will attempt to operate once again. If three consecutive faults occur in 60 minutes during a single heating or cooling demand, the unit will go into lockout mode, turning off the compressor, enabling the alarm output, and setting the fan back to low speed operation until the controller is reset. If the control faults due to the low pressure input (BI-3) being open during the pre-compressor startup check, the control will go into lockout mode immediately, disabling the compressor from starting and enabling the alarm output (BO-6). The lockout condition can be reset by powering down the controller, by a command from the BAS, or by the holding the ESC and Return keys on the MUI for 5 seconds.

Freeze Detection (AI-5)

The freeze detection sensor will monitor the liquid refrigerant temperature entering the water coil in the heating mode. If the temperature drops below the freeze detection trip point for the recognition delay period, the condition will be recognized as a fault. The freeze detection trip point will be factory set for 30°F and will be field selectable for 15°F by removing a jumper wire on BI-5. The freeze detection fault condition will be bypassed 2 minutes at normal compressor startup, to allow the refrigeration circuit to stabilize. If the freeze detection sensor becomes unreliable at any time compressor operation will immediately be suspended until the problem is corrected. This should be displayed as an alarm on the BAS and the MUI. This alarm will be reported a “Water Low Temp Limit” fault.

High Pressure (BI-11)

The high-pressure switch shall be a normally closed (NC) switch that monitors the systems refrigerant pressure. If the input senses the high-pressure switch is open it must disable the compressor output immediately and count the fault. The compressor minimum on time does not apply if the high-pressure switch opens. The compressor will not restart until the compressor short cycle time delay has been satisfied.

Low Pressure (BI-3)

The low-pressure switch shall be a normally closed (NC) switch that monitors the systems refrigerant pressure. The input shall be checked 15 seconds before compressor start up to be sure the pressure switch is closed and then ignored for the first 2 minutes after the compressor output (BO-2) is enabled. If the switch is open continuously for (30) seconds during compressor operation the compressor output (BO-2) will be disabled. The compressor will not restart until the compressor short cycle time delay has been satisfied.

Condensate Overflow

The condensate overflow sensing circuit will monitor the condensate level as a resistance input to AI-3. If the condensate water level rises resulting in the input resistance rising above the set point for the recognition delay period, the condition will be recognized as a fault. The condensate will be subjected to a (30) second lockout delay which requires that the fault be sensed for a continuous (30) seconds before suspending unit operation.

Alarm Output (BO-6)

The alarm output will be enabled when the control is in the lockout mode and will be disabled when the lockout is reset.

Test Mode

Raising the zone temperature input (AI-1) reading to 180–220°F or by holding the ESC and down arrow keys on the MUI for 5 seconds will put the control into test mode. In test mode the random start delay and the compressor fixed on delay time will both be shortened to 5 seconds and the reversing valve will be allowed to cycle with out shutting down the compressor. If an MUI is connected to the control LED 8 will flash and the words “Test Mode Enabled” will be shown on the LCD display when the control is in test mode. Test mode will be disabled after a power cycle, 30 minute timeout, or by holding the ESC and Up arrow keys on the MUI.

Sequence of Operation

Power Fail Restart

When the controller is first powered up, the outputs will be disabled for a random start delay. The delay is provided to prevent simultaneous starting of multiple heat pumps. Once the timer expires, the controller will operate normally.

Envision Controls - FX10

Random Start Delay

This delay will be used after every power failure, as well as the first time the compressor is started after the control exits the unoccupied mode or the emergency shutdown mode. The delay should not be less than 1 second and not longer than 120 seconds. If the control is in test mode the random start delay will be shortened to 5 seconds.

Compressor Fixed On Delay Time

The Compressor Fixed On Delay Time will ensure that the compressor output (B02) is not enabled for (90) seconds after the control receives a call to start the compressor. This delay is adjustable from 30 – 300 seconds over a BAS or a MUI. If the control is in test mode the Compressor Fixed On Delay Timer will be shortened to 5 seconds.

Compressor Minimum On Delay

The compressor minimum on delay will ensure that the compressor output is enabled for a minimum of (2) minute each time the compressor output is enabled. This will apply in every instance except in the event the high pressure switch is tripped or emergency shutdown then the compressor output will be disable immediately.

Compressor Short Cycle Delay Time

The compressor short cycle time delay will ensure that the compressor output will not be enabled for a minimum of (5) minutes after it is disabled. This allows for the system refrigerant pressures to equalize after the compressor is disabled.

Heating Cycle

On a call for heating, the blower enable output and accessory output 2 will turn on immediately after the random start delay timer has been satisfied. If the compressor short cycle time delay has been satisfied, the compressor will turn on after the blower enable and accessory output 2 are on and the fixed compressor start delay timers have been satisfied.

Auxiliary heat output can be controlled over the BAS.

Set Point Control Mode

In set point control mode the reversing valve output will be disabled. As the temperature drops below the heating set point and begins to operate in the heating proportional band, the low capacity compressor output (BO-2) will be enabled. A PI loop in the programming of the control will determine when the full capacity compressor output (BO-4) is to be enabled. The compressor must be operating in low capacity for a minimum of 30 seconds before the full capacity compressor output can be enabled. During low capacity compressor operation the ECM2 blower will operate in medium speed and will operate in high speed when the compressor is operating at full capacity.

Thermostat Control Mode

In thermostat mode the compressor will be cycled based on Y1 and Y2 calls from a room thermostat. When the control receives a Y1 command (BI-7) from the thermostat the low capacity compressor output (BO2) will be enabled and the ICM2 blower will operate in medium speed. When the control receives a Y2 command (BI-8) from the thermostat the full capacity compressor output will be enabled and the ICM2 blower will operate in high speed. During the heating cycle the reversing valve will be commanded into the off position.

Cooling Cycle

On a call for cooling, the blower enable output and accessory output 2 will turn on immediately after the random start delay timer has been satisfied. If the compressor short cycle time delay has been satisfied, the compressor will turn on after the blower enable and accessory output 2 are on and the fixed compressor start delay timers have been satisfied.

Set Point Control Mode

In set point control mode the reversing valve output will be enabled. As the temperature falls below the cooling set point and begins to operate in the cooling proportional band, the low capacity compressor output (BO-2) will be enabled. A PI loop in the programming of the control will determine when the full capacity compressor output (BO-4) is to be enabled. The compressor must be operating in low capacity for a minimum of 30 seconds before the full capacity compressor output can be enabled. During low capacity compressor operation the ICM2 blower will operate in medium speed and will operate in high speed when the compressor is operating at full capacity.

Thermostat Control Mode

In thermostat mode the compressor will be cycled based on Y1 and Y2 calls from a room thermostat. When the control receives a Y1 command (BI-7) from the thermostat the low capacity compressor output (BO2) will be enabled and the ICM2 blower will operate in medium speed. When the control receives a Y2 command (BI-8) from the thermostat the full capacity compressor output will be enabled and the ICM2 blower will operate in high speed. During the cooling cycle the reversing valve will be commanded into the “ON” position.

Envision Controls - FX10

ECM2 Blower Operation

Fan speeds will be selected through the user interface or the facility management system. There will be a total of 12 speeds selectable with only three being selected at any one time. The lowest numbered speed selection set to ON will select the low-speed fan setting, the middle selection set to ON will select the medium-speed fan setting and the highest selection set to ON will select the high-speed fan setting. If all selections are set to OFF the software shall select speed setting 10 for low-speed, 11 for medium-speed, and will select speed setting 12 for high speed. If only one selection is set to ON, that selection will set the low-speed fan setting, the medium-speed setting will be 11, and the high-speed setting will be speed 12. The maximum low-speed setting will be speed 10 and the minimum high-speed setting will be speed 3. In addition there is a low limit setting in the software to prevent the ECM2 fan speed from being set below acceptable limits for each unit size.

ECM Fan air flow "Soft Switch Settings"

A set of 12 "soft switches" accessible through the user interface or building automation system are used to select the three fan speed settings for the ECM fan motor. The 12 soft switches work in exactly the same way as the hardware switches used on the Premier control (Refer to Fan Performance Data - ECM Motor for proper settings). No more than three soft switches may be set to the "ON" position. The first "ON" switch (the lowest number switch) determines the "low speed fan" setting. The second determines the "medium speed fan" setting, and the third determines the "high speed fan" setting.

Emergency Heat/Network Enabled Output (BO5)

This output is set from the factory to enable/disable emergency heat. If a problem occurs with the unit resulting in the compressor being locked out in heating mode, the control will automatically enable this output to turn on field installed electric heat. This output is interlocked with the fan proving input BI-6 (Fan proving sensors must be field supplied and installed). BI-6 must be connected to PB2 position 3 (see unit schematic) in the field if no fan proving sensor is desired. There is a configurable parameter available through a BAS network that must be enabled if this output is to be commanded over the BAS network.

MUI Alarm History Reporting

If a fault occurs the fault will be recorded in history for display on the medium user interface in the History Menu. Each fault type will be displayed in the history menu with a number between 0 and 3. A reading of 3+ will mean that fault has occurred more than three times in the past. The history menu can be cleared with a power cycle only. Alarm date and time are not included in the history.

Inputs & Outputs Configuration

Field Selectable Options

Freeze Detection Set Point (BI-5)

The freeze detection set point input allows you to adjust the freeze detection set point (AI-5). When the jumper is installed on BI-5 (Wire #24) the freeze detection set point is factory set for 30°F. When the jumper on BI-5 (Wire #24) is removed the freeze detection set point will be 15°F.

Accessory Outputs (BO-7 and BO-8)

Accessory Output 1 will be energized 90 seconds prior to the compressor output being energized. Accessory Output 2 will be energized with the fan output (BO-1). When the corresponding compressor output is turned off the accessory output will be deactivated immediately. These outputs are selectable for normally open or normally closed operation through the Medium User interface or through the Building Automation System.

SINGLE and DUAL STAGE WATER-TO-AIR			
Input Name	**Input**	**Output Name**	**Output**
Zone Temp 1	AI 1	Fan Enable	BO1
Relative Humidity Input	AI 2	Comp – Low Capacity	BO2
Condensate Level	AI 3	Reversing Valve	BO3
Universal Temp Input	AI 4	Comp – Full Capacity	BO4
Water Coil Low Temperature Limit	AI 5	Network Output/EH Output	BO5
Warm/Cool Adjust and Temp Occ	AI 6	Alarm	BO6
		Accessory 1 Output	BO7
Occupied	BI 1	Accessory 2 Output	BO8
Emergency Shutdown	BI 2	Network Controlled Output	B09
Stage 1 Low Pressure	BI 3		
Network Viewable Input 1	BI 4	ICM2 Fan	PWM1
Water Coil Low Temp Limit Set Point	BI 5	Network Controlled Output	PWM2
Network Viewable Input 2	BI 6		
Thermostat Y1	BI 7		
Thermostat Y2	BI 8		
Thermostat O	BI 9		
Thermostat G	B10		
Stage 1 High Pressure	BI11		
Compressor Proving	BI12		
XP10 Expansion Card			
Input Name	**Input**	**Output Name**	**Output**
Unused	AI 1	Unused	BO 1
Unused	AI 2	Unused	BO 2
Unused	AI 3	Unused	BO 3
Unused	AI 4	Unused	BO 4

Control Accessories

Zone Sensors

- TAXXJ02 Room Command Module
- TAXXA01 LCD Room Command Module
- A99 Sensor

MUI (LCD User interface) for diagnostics and commissioning.

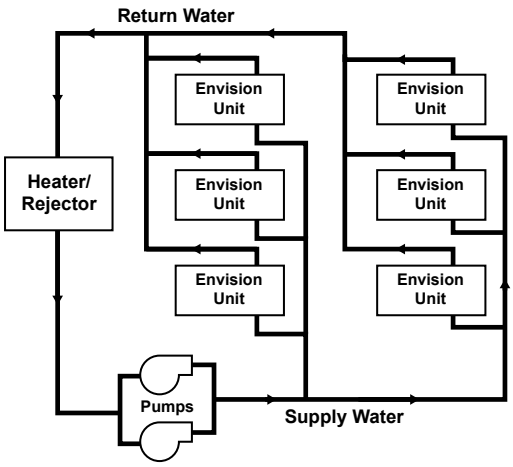
- MUIK1 - Panel Mount, Portable
- MUIK2 - Wall Mount

Envision Application Notes

The Closed Loop Heat Pump Concept

The basic principle of a water source heat pump is the transfer of heat into water from the space during cooling, or the transfer of heat from water into the space during heating. Extremely high levels of energy efficiency are achieved as electricity is used only to move heat, not to produce it. Using a typical WaterFurnace Envision Series, one unit of electricity will move four to five units of heat.

When multiple water source heat pumps are combined on a common circulating loop, the ultimate in energy efficiency is created: The WaterFurnace units on cooling mode are adding heat to the loop which the units in heating mode can absorb, thus removing heat from the area where cooling is needed, recovering and redistributing that heat for possible utilization elsewhere in the system. In modern commercial structures, this characteristic of heat recovery from core area heat generated by lighting, office equipment, computers, solar radiation, people or other sources, is an important factor in the high efficiency and low operating costs of WaterFurnace closed source heat pump systems.



In the event that a building's net heating and cooling requirements create loop temperature extremes, Envision Series units have the extended range capacity and versatility to maintain a comfortable environment for all building areas. Excess heat can be stored for later utilization or be added or removed in one of three ways; by ground-source heat exchanger loops: plate heat exchangers connected to other water sources, or conventional cooler/boiler configurations. Your WaterFurnace representative has the expertise and computer software to assist in determining optimum system type for specific applications.

The Closed Loop Advantage

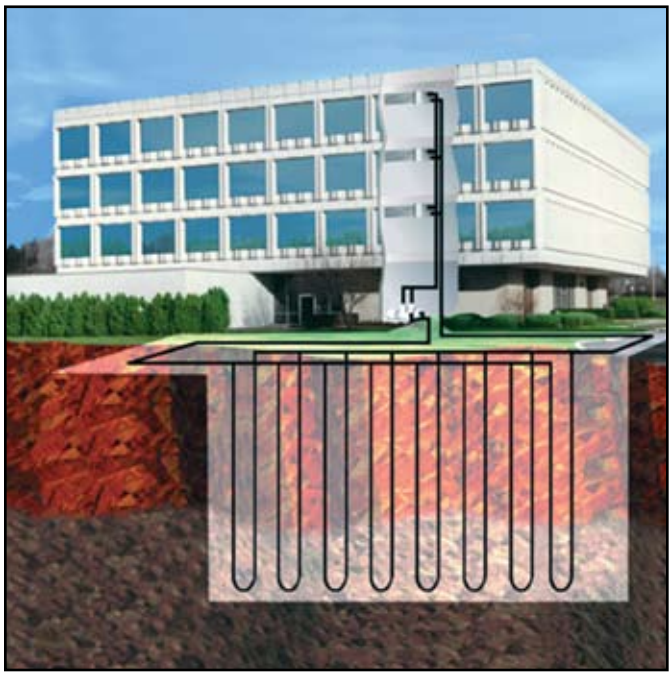
A properly applied water source heat pump system offers many advantages over other systems. First costs are low because units can be added to the loop on an "as needed basis"- perfect for speculative buildings. Installed costs are low since units are self-contained and can be located adjacent to the occupied space, requiring minimal ductwork. Maintenance can be done on individual units without system shut-down. Conditions remain comfortable since each unit operates separately, allowing cooling in one area and heating in another. Tenant spaces can be finished and added as needed. Power billing to tenants is also convenient since each unit can be individually metered: each pays for what each uses. Nighttime and/or weekend uses of certain areas are possible without heating or cooling the entire facility. A decentralized system also means if one unit should fault, the rest of the system will continue to operate normally, as well as eliminating air cross-contamination problems and expensive high pressure duct systems requiring an inefficient electric resistance reheat mode.

The Envision Approach

There are a number of proven choices in the type of Envision Series system which would be best for any given application. Most often considered are:

• ***Closed Loop/Ground-Source Systems*** utilize the stable temperatures of the earth to maintain proper water source temperatures (via vertical or horizontal closed loop heat exchangers) for Envision Series extended range heat pump system. Sizes range from a single unit through many hundreds of units. When net cooling requirements cause closed loop water temperatures to rise, heat is dissipated

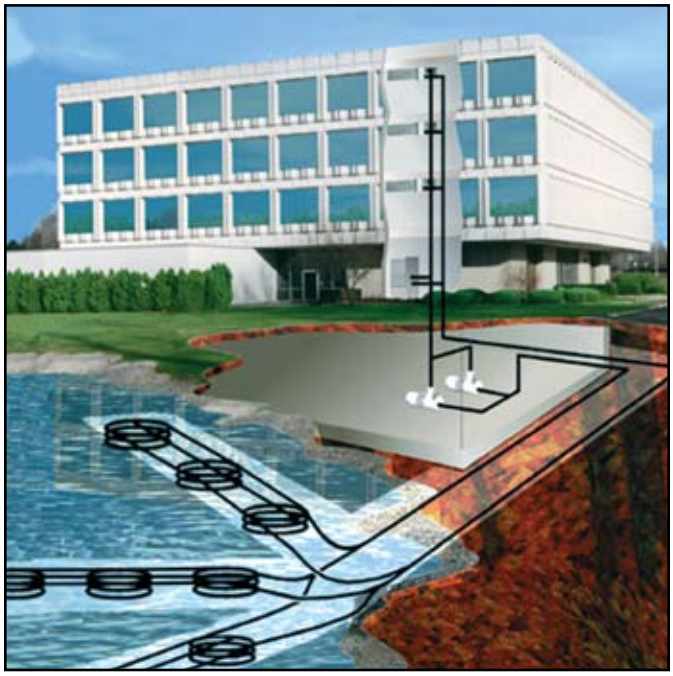
Vertical - Closed Loop/Ground Source



Envision Application Notes

into the cooler earth through buried high strength plastic pipe "heat exchangers." Conversely if net space heating demands cause loop heat absorption beyond that heat recovered from building core areas, the loop temperature will fall causing heat to be extracted from the earth. Due to the extended loop temperatures, AHRI/ISO 13256-1 Ground Loop Heat Pumps are required for this application. Because auxiliary equipment such as a fossil fuel boiler and cooling tower are not required to maintain the loop temperature, operating and maintenance costs are very low.

Surface Water - Closed Loop/Ground Source



Ground-source systems are most applicable in residential and light commercial buildings where both heating and cooling are desired, and on larger envelope dominated structures where core heat recovery will not meet overall heating loads. Both vertical and horizontally installed closed-loops can be used. The land space required for the "heat exchangers" is 100-250 sq. ft./ton on vertical (drilled) installations and 750-1500 sq. ft./ton for horizontal (trenched) installations. Closed loop heat exchangers can be located under parking areas or even under the building itself.

On large multi-unit systems, sizing the closed loop heat exchanger to meet only the net heating loads and assisting cooling loads with a closed circuit cooling tower may be the most cost effective choice.

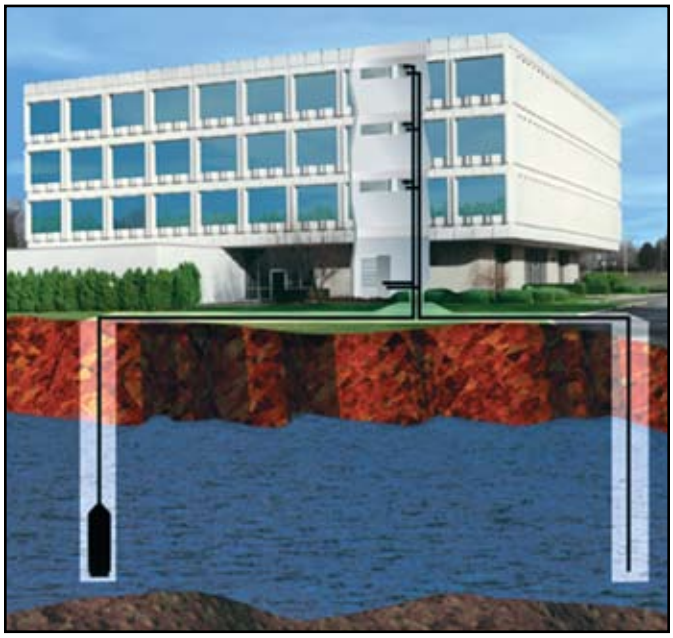
• ***Closed Loop/Ground-Source Surface Water Systems*** also utilize the stable temperatures of Surface Water to maintain proper water source temperatures for Envision Series extended range heat pump systems. These systems have all of the advantages of horizontal and vertical closed loop systems. Due to the extended loop temperatures, AHRI/ISO 13256-1 Ground Water or Ground Loop Heat Pumps are required for this application.

In cooling dominated structures, the ground-source surface water systems can be very cost effective especially where local building codes require water retention ponds for short term storage of surface run-off. Sizing requirements for the surface water is a minimum of 500 sq. ft./lon of surface area at a minimum depth of 8 feet. WaterFurnace should be contacted when designs for heating dominated structures are required.

• ***Closed Loop/Ground Water Plate Heat Exchanger Systems*** utilize lake, ocean, well water or other water sources to maintain closed loop water temperatures in multi-unit Envision systems. A plate frame heal exchanger isolates the units from any contaminating effects of the water source, and allows periodic cleaning of the heat exchanger during off peak hours.

Operation and benefits are similar to those for ground-source systems. Due to the extended loop temperatures, AHRI/ISO 13256-1 Ground Loop Heat Pumps are required for this application. Closed loop plate heat exchanger systems are applicable in commercial, marine, or industrial

Plate Heat Exchanger - Closed Loop/Ground Water



structures where the many benefits of a water source heat pump system are desired, regardless of whether the load is heating or cooling dominated.

Envision Application Notes

• ***Closed Loop /Cooler-Boiler Systems*** utilize a closed heat recovering loop with multiple water source heat pumps in the more conventional manner. Typically a boiler is employed to maintain closed loop temperatures above 60°r and a cooling tower to maintain loop temperatures below 90°F. These systems are applicable in medium to large buildings regardless of whether the load is heating or cooling dominated. Due to the moderate loop temperatures, AHRI/ISO 13256-1 Water Loop Heat Pumps are required for this application.

Cooler/Boiler - Closed Loop

Envision Application Notes

Typical Unit Installation

Unit Location

Locate the unit in an indoor area that allows for easy removal of the filter and access panels. Location should have enough space for service personnel to perform maintenance or repair. Provide sufficient room to make water, electrical and duct connection(s). If the unit is located in a confined space, such as a closet, provisions must be made for return air to freely enter the space by means of a louvered door, etc. Any access panel screws that would be difficult to remove after the unit is installed should be removed prior to setting the unit. On horizontal units, allow adequate room below the unit for a condensate drain trap and do not locate the unit above supply piping. **Care should be taken when units are located in unconditioned spaces to prevent damage from frozen water lines and excessive heat that could damage electrical components.**

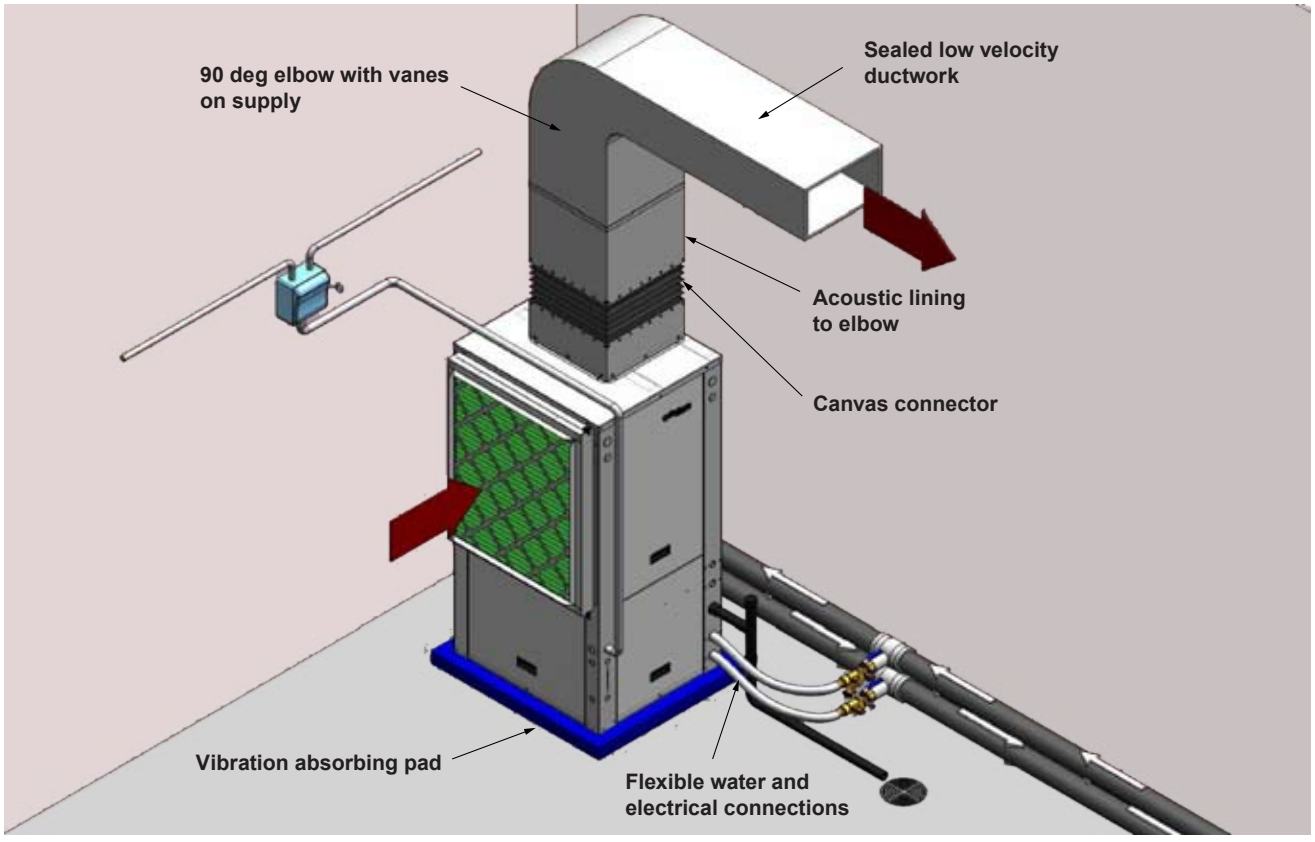
Installing Vertical Units

Prior to setting the unit in place, remove and discard the compressor hold down shipping bolt located at the front of the compressor mounting bracket. Vertical units are available in left or right air return configurations. Top flow vertical units should be mounted level on a vibration absorbing pad slightly larger than the base to provide isolation between the unit and the floor. It is not necessary to anchor the unit to the floor. Bottomflow units should be mounted level and sealed well to floor to prevent air leakage. Bottomflow units require the supply air opening to be cut at least 1/2˝ larger than the units' air outlet. Protect the edges of combustible flooring with sheet metal over-wrap or other non-combustible material.

WARNING: Before performing service or maintenance operations on a system, turn off main power switches to the indoor unit. If applicable, turn off the accessory heater power switch. Electrical shock could cause personal injury.

Installing and servicing heating and air conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair or service heating and air conditioning equipment. Untrained personnel can perform the basic maintenance functions of cleaning coils and cleaning and replacing filters.

All other operations should be performed by trained service personnel. When working on heating and air conditioning equipment, observe precautions in the literature, tags and labels attached to the unit and other safety precautions that may apply. Follow all safety codes. Wear safety glasses and work gloves. Use a quenching cloth for brazing operations and have a fire extinguisher available.


90 deg elbow with vanes on supply
Sealed low velocity ductwork
Acoustic lining to elbow
Canvas connector
Vibration absorbing pad
Flexible water and electrical connections

Envision Application Notes

Installing Horizontal Units

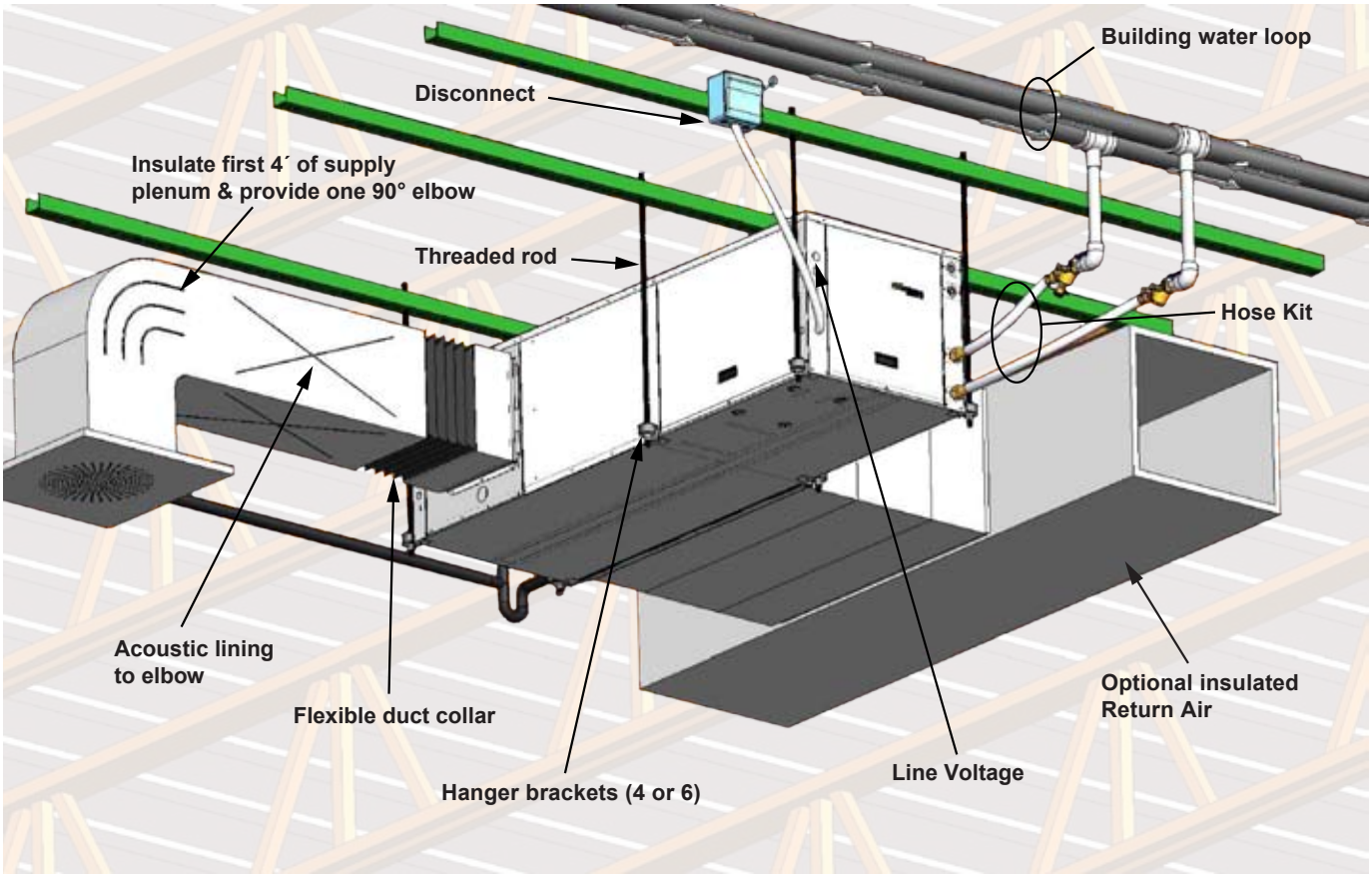
Remove and discard the compressor hold down shipping bolt located at the front mounting bracket prior to setting the unit in place. Horizontal units are available with side or end discharge and may be field converted from one to the other by replacing the discharge panel with a new panel which must be ordered separately. Horizontal units are normally suspended from a ceiling by four or six 3/8″ diameter threaded rods. The rods are usually attached to the unit by hanger bracket kits furnished with each unit. Lay out the threaded rods per the dimensions below. Assemble the hangers to the unit as shown. Securely tighten the brackets to the unit using the weld nuts located on the underside of the bottom panel. When attaching the hanger rods to the bracket, a double nut is required since vibration could loosen a single nut. To allow filter access, one bracket on the filter side should be installed 180° from the position shown in the figure below.

NOTE: The unit should be pitched approximately 1/4″ towards the drain in both directions to facilitate the removal of condensate.

Use only the bolts provided in the kit to attach hanger brackets. The use of longer bolts could damage internal parts. Some residential applications require the installation of horizontal units on an attic floor. In this case, the unit should be set in a full size secondary drain pan on top of a vibration absorbing pad. The secondary drain pan prevents possible condensate overflow or water leakage damage to the ceiling. The secondary drain pan is usually placed on a plywood base isolated from the ceiling joists by additional layers of vibration absorbing material.

Insulate supply plenum and use at least one 90° elbow and flexible duct collar to reduce noise.

CAUTION: Do not use rods smaller than 3/8″ diameter since they may not be strong enough to support the unit. The rods must be securely anchored to the ceiling.



Envision Application Notes

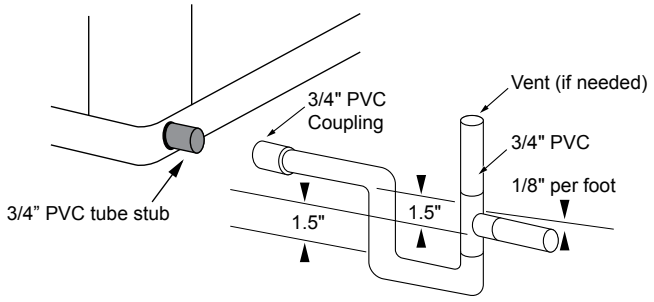
Water Piping

Piping is usually design as 'reverse return' to equalize flow paths through each unit. A short flexible pressure rated hose is used to make connection to the fixed building piping system. This hose is typically stainless steel braid and includes a swivel fitting on one end for easy removal and is flexible to help isolate the unit for quieter operation . Isolation valves for servicing, y-strainers for filtering and memory-stop flow valve or a balancing valve can be provided for consistent water flow through the unit.

All unit source water connections are fittings that accept a male pipe thread (MPT). Insert the connectors by hand, then tighten the fitting with a wrench to provide a leakproof joint. The open and closed loop piping system should include pressure/temperature ports for serviceability. The proper water flow must be provided to each unit whenever the unit operates. To assure proper flow, use pressure/temperature ports to determine the flow rate. These ports should be located at the supply and return water connections on the unit. The proper flow rate cannot be accurately set without measuring the water pressure drop through the refrigerant-to-water heat exchanger. Never use flexible hoses smaller than 1″ inside diameter on the unit. Limit hose length to 10 feet per connection. Check carefully for water leaks.

Condensate Drain

On vertical units, the internal condensate drain assembly consists of a drain tube which is connected to the drain pan, a 3/4″ PVC female adapter and a flexible connecting hose. The female adapter may exit either the front or the side of the cabinet. The adapter should be glued to the field-installed PVC condensate piping. On vertical upflow units, a condensate hose is inside all cabinets as a trapping loop; therefore, an external trap is not necessary. On horizontal units, a PVC stub is provided for condensate drain piping connection. An external trap is required (see below). If a vent is necessary, an open stand pipe may be applied to a tee in the field-installed condensate piping.



Envision Application Notes

Acoustical Considerations and Equipment Sound Performance

Sound Performance

The Envision Series is third party sound rated in accordance with ARI 260. Please consult WaterFurnace Sound Performance Data Catalog for details on the ARI standard and sound performance data.

Recommendations for Noise Reduction

Horizontal Unit Location

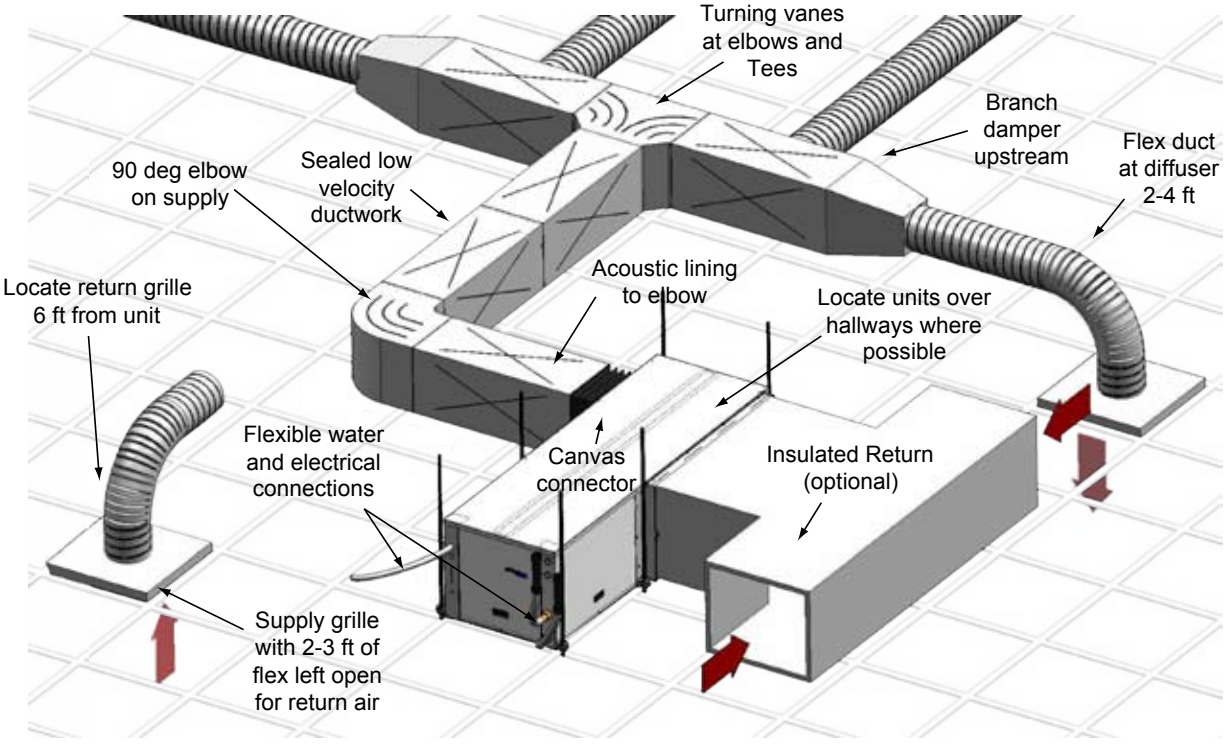
- Specify equipment with quietest sound power ratings
- Do not locate units above areas with a required NC 40 or less
- Space WSHP at least 10 ft (3m) apart to avoid noise summing of multiple units in a space.
- Maximize the height of the unit above the ceiling (horizontal).
- Suspend unit with isolation grommets that are appropriately rated to reduce vibrations (horizontal).

Vertical Unit Location

- Specify equipment with quietest sound power ratings
- Space WSHP at least 10 ft (3m) apart to avoid noise summing of multiple units in a space.
- Acoustic ceiling coatings can greatly reduce noise levels in mechanical rooms.
- Mount unit on a sound absorbing pad, extruded polystyrene, rubber or cork pad.

Ductwork

- Insure return air grilles will not allow line of site noise to transfer to adjacent space. Use a sound barrier or some other material to isolate the grille from the unit. A supply grille, boot and short piece of flex duct pointed away from the unit can greatly attenuate equipment noise.
- Use a canvas isolation duct connector at the supply and return duct connection of the unit.
- Internally line the discharge and return duct within the first 4-8 feet of unit with acoustic insulation. Install an internally lined 'L' shaped return duct elbow at return grille. Face the elbow away from adjacent units.
- Always install at least one 90° elbow in the discharge duct to eliminate line of sight noise transmission of the blower.
- Use turning vanes at all elbows and tees to reduce turbulence.
- Limit supply duct velocities to less than 1000 fpm
- Design and install ductwork as stiff as possible
- Allow 3 duct diameters both up and down stream of the unit before any fittings or transitions are installed.
- Use duct sealant on all duct joints.
- Install a short (2-4') of flex duct on all branch ducts just prior to discharge boot or diffuser to reduce vibration and duct sound prior to delivery in the room.
- Locate the branch duct balancing damper as far away from the diffuser as possible.
- In ceiling plenum systems, install an internally lined 'L' shaped return duct elbow at unit. Face the elbow away from adjacent units (horizontal).


Turning vanes at elbows and Tees
Branch damper upstream
Flex duct at diffuser 2-4 ft
90 deg elbow on supply
Sealed low velocity ductwork
Acoustic lining to elbow
Locate return grille 6 ft from unit
Locate units over hallways where possible
Flexible water and electrical connections
Canvas connector
Insulated Return (optional)
Supply grille with 2-3 ft of flex left open for return air

Selection Example

To achieve optimal performance, proper selection of each heat pump is essential. A building load program should be used to determine the heating and cooling load of each zone. WFI Select computer software selection program can then be used to develop an accurate and complete heat pump schedule. WFI Select can be obtained from your local WaterFurnace representative.

While WFI Select is the easiest and most accurate method to size and select equipment, however, selection can still be accomplished manually using this manual and the following selection procedure. Sizing so that the actual sensible capacity of the equipment will satisfy the sensible capacity of the zone is the recommended method for best results.

Boiler/Tower Application

Typical boiler/tower application will result in entering water temperatures of 60-90°F with 70°F for heating and 90°F for cooling. Water to refrigerant insulation option would not be required. Flow rates are 2.5 to 3 gpm per ton with 2.5 gpm per ton often representing an economical design point.

Geothermal Application

Typical geothermal application can result in a wide entering water temperature range of 30-100°F. Typically minimum heating entering water temperatures can range from 30 to 50°F depending upon loop type and geographical location. Cooling performance should be calculated using a maximum loop temperature of 100°F in most loop applications. Water flow is typically 2.5 to 3 gpm per ton with 3 gpm per ton recommended with the more extreme loop temperatures. **PLEASE NOTE THAT WATER COIL INSULATION OPTION SHOULD BE SELECTED WHEN ENTERING WATER TEMPERATURES ARE EXPECTED TO BE BELOW 45-50°F.**

Geothermal Selection Example

Step 1: Determine the actual heating and cooling loads at the desired dry bulb and wet bulb conditions.

Step 2: Obtain the following de sign parameters: Entering water temperature, water flow rate in GPM, air flow in CFM, water flow pressure drop and design wet and dry bulb temperatures. Air flow CFM should be between 300 and 450 CFM per ton. Unit water pressure drop should be kept as close as possible to each other to make water balancing easier. Go to the appropriate tables and find the proper indicated water flow and water temperature.

Step 3: Select a unit based on total and sensible cooling conditions. Select a unit which is closest to, but no larger than, the actual cooling load.

Step 4: Enter tables at the design water flow and water temperature. Read the total and sensible cooling capacities (Note: interpolation is permissible, extrapolation is not).

Step 5: Read the heating capacity. If it exceeds the design criteria it is acceptable. It is quite normal for water source heat pumps to be selected on cooling capacity only since the heating output is usually greater than the cooling capacity.

Step 6: Determine the correction factors associated with the variable factors of dry bulb and wet bulb.
Corrected Total Cooling tabulated total cooling x wet bulb correction.
Corrected Sensible Cooling tabulated sensible cooling x wet/dry bulb correction.

Step 7: Compare the corrected capacities to the load requirements. Normally if the capacities are within 10% of the loads, the equipment is acceptable. It is better to undersize than oversize, as undersizing improves humidity control, reduces sound levels and extends the life of the equipment.

Step 8: When complete, calculate water temperature rise and assess the selection. If the units selected are not within 10% of the load calculations, then review what effect changing the GPM, water temperature and/or air flow and air temperature would have on the corrected capacities. If the desired capacity cannot be achieved, select the next larger or smaller unit and repeat the procedure. Remember, when in doubt, undersize slightly for best performance.

Example Equipment Selection - Cooling

1. Load Determination:
Assume we have determined that the appropriate cooling load at the desired dry bulb 80°F and wet bulb 65°F conditions is as follows:
Total Cooling..... 21,200 BTUH
Sensible Cooling..... 15,700 BTUH
Entering Air Temp..... 75°F Dry Bulb / 60°F Wet Bulb

2. Design Conditions:
Similarly, we have also obtained the following design parameters:
Entering Water Temp..... 100°F
Water Flow (Based upon 10°F rise in temp.) 6.0 GPM
Air Flow Required..... 755 CFM @ 0.4 in. wg.

Selection Example

3, 4 & 5. HP Selection:
After making our preliminary selection (NS*022 PSC), we enter the tables at design water flow and water temperature and read
Total Cooling, Sens. Cooling and Heat of Rej. capacities:
Total Cooling.....20,300 BTUH
Sensible Cooling.....15,700 BTUH
Heat of Rejection .....25,900 BTUH

6 & 7. Entering Air and Airflow Corrections:
Next, we determine our correction factors. (Refer to Correction Factor Tables - Air Flow and Entering Air correction tables — using 755 cfm. or 755÷700 nom. 108%).
Corrected Total Cooling 20,300 x 1.007 x 0.897 18,337
Corrected Sens Cooling 15,700 x 1.034 x 0.995 16,153
Corrected Heat of Reject 25,900 x 1.010 x 0.951 24,877

HR 500 x GPM x (T_{in} - T_{out})

$$\frac{HR}{500 \times GPM} = (Tin - Tout) \text{ or } \Delta T \text{ Rise}$$

$$\frac{24,877}{500 \times 6} \quad 8.29 \text{ °F Rise}$$

8. Water Temperature Rise Calculation & Assessment:
Note: 500 parameters for water & 485 parameters for antifreeze solutions to 30% weight.

When we compare the Corrected Total Cooling and Corrected Sensible Cooling figures with our load requirements stated in Step 1, we discover that our selection is within +10% of our sensible load requirement. Further more, we see that our Corrected Total Cooling figure is within 1,000 Btuh of the actual indicated load.

Antifreeze Corrections

Catalog performance can be corrected for antifreeze use. Please use the following table and note the example given.

Antifreeze Type	Antifreeze % by wt	Cooling Capacity	Heating Capacity	Pressure Drop
EWT - degF [DegC]		**90 [32.2]**	**30 [-1.1]**	**30 [-1.1]**
Water	0	1.000	1.000	1.000
Ethylene Glycol	10	0.991	0.973	1.075
	20	0.979	0.943	1.163
	30	0.965	0.917	1.225
	40	0.955	0.890	1.324
	50	0.943	0.865	1.419
Propylene Glycol	10	0.981	0.958	1.130
	20	0.969	0.913	1.270
	30	0.950	0.854	1.433
	40	0.937	0.813	1.614
	50	0.922	0.770	1.816
Ethanol	10	0.991	0.927	1.242
	20	0 972	0.887	1.343
	30	0 947	0.856	1.383
	40	0 930	0.815	1.523
	50	0.911	0.779	1.639
Methanol	10	0 986	0.957	1.127
	20	0 970	0.924	1.197
	30	0 951	0.895	1.235
	40	0 936	0.863	1.323
	50	0 920	0.833	1.399

***Warning**: Gray area represents antifreeze concentrations greater than 35% by weight and should be avoided due to the extreme performance penalty they represent.*

Antifreeze Correction Example

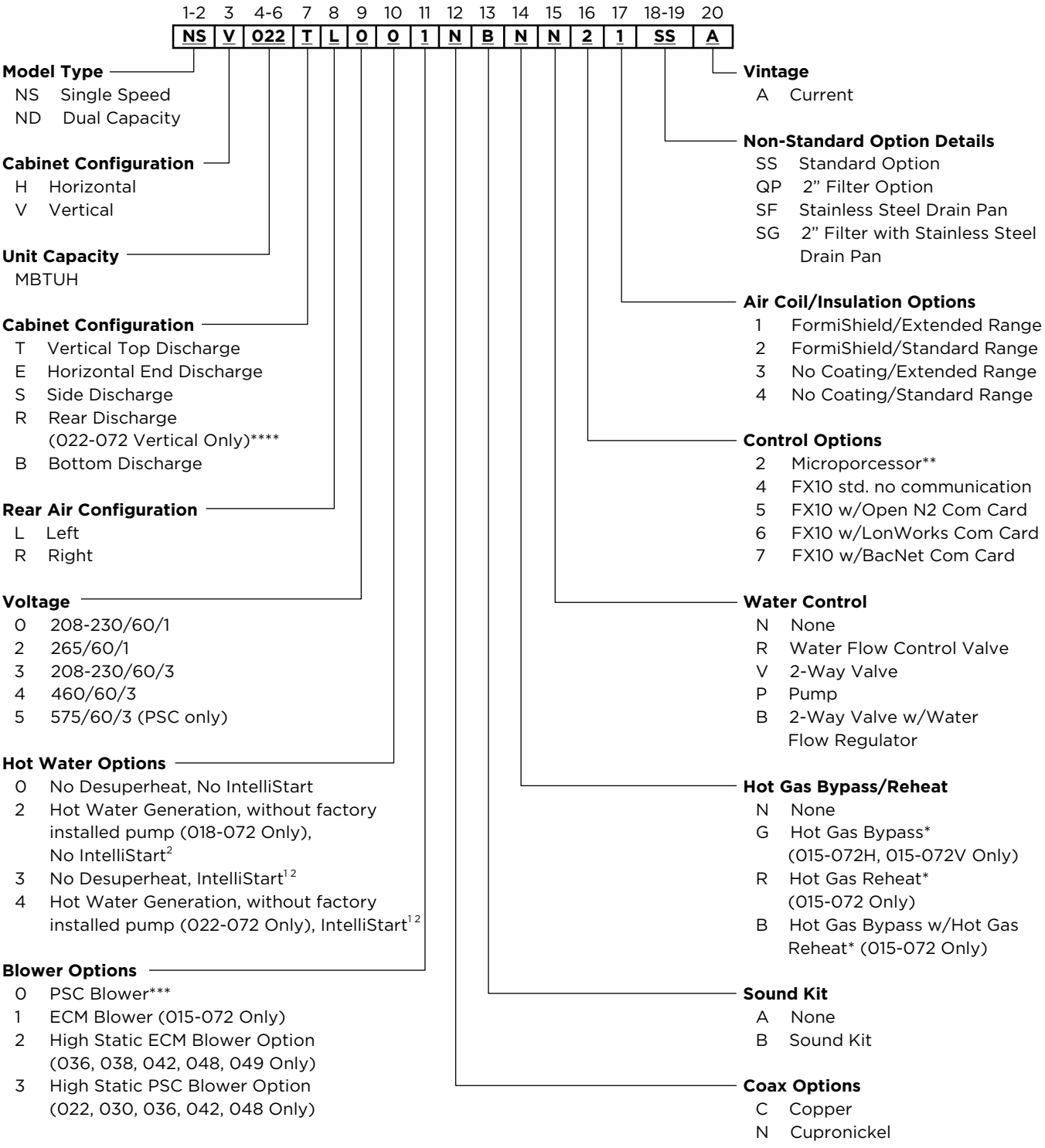
Antifreeze solution is Propylene Glycol 20% by weight. Determine the corrected heating and cooling performance at 30°F and 90°F respectively as well as pressure drop at 30°F for an Envision Series NS*048-PSC.

The corrected cooling capacity at 90°F would be: 46,500 MBtuh x 0.969 45,059 MBtuh

The corrected heating capacity at 30°F would be: 38,000 MBtuh x 0.913 34,694 MBtuh

The corrected pressure drop at 30°F and 12 GPM would be: 9.0 feet of head x 1.270 11.43 feet of head

Model Nomenclature


1-2 3 4-6 7 8 9 10 11 12 13 14 15 16 17 18-19 20
NS V 022 T L 0 0 1 N B N N 2 1 SS A
Model Type
NS Single Speed
ND Dual Capacity
Cabinet Configuration
H Horizontal
V Vertical
Unit Capacity
MBTUH
Cabinet Configuration
T Vertical Top Discharge
E Horizontal End Discharge
S Side Discharge
R Rear Discharge (022-072 Vertical Only)****
B Bottom Discharge
Rear Air Configuration
L Left
R Right
Voltage
0 208-230/60/1
2 265/60/1
3 208-230/60/3
4 460/60/3
5 575/60/3 (PSC only)
Hot Water Options
0 No Desuperheat, No IntelliStart
2 Hot Water Generation, without factory installed pump (018-072 Only), No IntelliStart2
3 No Desuperheat, IntelliStart1 2
4 Hot Water Generation, without factory installed pump (022-072 Only), IntelliStart1 2
Blower Options
0 PSC Blower***
1 ECM Blower (015-072 Only)
2 High Static ECM Blower Option (036, 038, 042, 048, 049 Only)
3 High Static PSC Blower Option (022, 030, 036, 042, 048 Only)
Vintage
A Current
Non-Standard Option Details
SS Standard Option
QP 2" Filter Option
SF Stainless Steel Drain Pan
SG 2" Filter with Stainless Steel Drain Pan
Air Coil/Insulation Options
1 FormiShield/Extended Range
2 FormiShield/Standard Range
3 No Coating/Extended Range
4 No Coating/Standard Range
Control Options
2 Microporcessor**
4 FX10 std. no communication
5 FX10 w/Open N2 Com Card
6 FX10 w/LonWorks Com Card
7 FX10 w/BacNet Com Card
Water Control
N None
R Water Flow Control Valve
V 2-Way Valve
P Pump
B 2-Way Valve w/Water Flow Regulator
Hot Gas Bypass/Reheat
N None
G Hot Gas Bypass* (015-072H, 015-072V Only)
R Hot Gas Reheat* (015-072 Only)
B Hot Gas Bypass w/Hot Gas Reheat* (015-072 Only)
Sound Kit
A None
B Sound Kit
Coax Options
C Copper
N Cupronickel

NOTES:

* Not available with desuperheater

** Not available with Hot Gas Reheat

*** Not available on dual capacity models, nor 265V 030

**** Not available on Hot Gas Bypass/Reheat

[1] Not available in model sizes 009-018

[2] Field installed external pump kit (DPK4) required for hot water generation

6/22/09

Performance Standard (AHRI/ISO/ASHRAE 13256-1)

The performance standard AHRI/ASHRAE/ISO 13256-1 became effective January 1, 2000 and replaces AHRI Standards 320, 325, and 330. This new standard has three major categories: Water Loop (comparable to ARI 320), Ground Water (ARI 325), and Ground Loop (ARI 330). Although these standards are similar there are some differences:

Unit of Measure: The Cooling COP

The cooling efficiency is measured in EER (US version measured in Btuh per Watt. The Metric version is measured in a cooling COP (Watt per Watt) similar to the traditional COP measurement.

Water Conditions Differences

Entering water temperatures have changed to reflect the centigrade temperature scale. For instance the water loop heating test is performed with 68°F (20°C) water rounded down from the old 70°F (21.1°C).

Air Conditions Differences

Entering air temperatures have also changed (rounded down) to reflect the centigrade temperature scale. For instance the cooling tests are performed with 80.6°F (27°C) dry bulb and 66.2°F (19°C) wet bulb entering air instead of the traditional 80°F (26.7°C) DB and 67°F (19.4°C) WB entering air temperatures. 80.6/66.2 data may be converted to 80/67 using the entering air correction table. This represents a significantly lower relative humidity than the old 80/67 of 50% and will result in lower latent capacities.

Pump Power Correction Calculation

Within each model, only one water flow rate is specified for all three groups and pumping Watts are calculated using the following formula. This additional power is added onto the existing power consumption.

• Pump power correction (gpm x 0.0631) x (Press Drop x 2990) / 300

Where 'gpm' is waterflow in gpm and 'Press Drop' is the pressure drop through the unit heat exchanger at rated water flow in feet of head.

Fan Power Correction Calculation

Fan power is corrected to zero external static pressure using the following equation. The nominal airflow is rated at a specific external static pressure. This effectively reduces the power consumption of the unit and increases cooling capacity but decreases heating capacity. These Watts are significant enough in most cases to increase EER and COPs fairly dramatically over ARI 320, 325, and 330 ratings.

• Fan Power Correction (cfm x 0.472) x (esp x 249) / 300

Where 'cfm' is airflow in cfm and 'esp' is the external static pressure at rated airflow in inches of water gauge.

ISO Capacity and Efficiency Calculations

The following equations illustrate cooling calculations:

• ISO Cooling Capacity Cooling Capacity (Btuh) + (Fan Power Correction (Watts) x 3.412)

• ISO EER Efficiency (W/W) ISO Cooling Capacity (Btuh) x 3.412 / [Power Input (Watts) - Fan Power Correction (Watts) + Pump Power Correction (Watt)]

The following equations illustrate heating calculations:

• ISO Heating Capacity Heating Capacity (Btuh) - (Fan Power Correction (Watts) x 3.412)

• ISO COP Efficiency (W/W) ISO Heating Capacity (Btuh) x 3.412 / [Power Input (Watts) - Fan Power Correction (Watts) + Pump Power Correction (Watt)]

Comparison of Test Conditions

	ARI 320	ISO/ARI 13256-1 WLHP	ARI 325	ISO/ARI 13256-1 GWHP	ARI 330	ISO/ARI 13256-1 GLHP
Cooling						
Entering Air DB/WB °F	80/67	80 6/66 2	80/67	80 6/66 2	80/67	80 6/66 2
Entering Water °F	85	86	50/70	59	77	77
Fluid Flow Rate	*	**	**	**	**	**
Heating						
Entering Air DB/WB °F	70	68	70	68	70	68
Entering Water °F	70	68	50/70	50	32	32
Fluid Flow Rate	*	**	**	**	**	**

Note *: Flow rate is set by 10°F rise in standard cooling test Note **: Flow rate is specified by the manufacturer
Part load entering water conditions not shown
WLHP = Water Loop Heat Pump; GWHP = Ground Water Heat Pump; GLHP = Ground Loop Heat Pump

Conversions:

Airflow (lps) CFM x 0.472; Water Flow (lps) GPM x 0.0631;
ESP (Pascals) ESP (in wg) x 249; Press Drop (Pascals) Press Drop (ft hd) x 2990

AHRI/ISO 13256-1 Performance Ratings

	Model	Capacity Modulation	Flow Rate		Water Loop Heat Pump				Ground Water Heat Pump				Ground Loop Heat Pump			
					Cooling EWT 86°F		Heating EWT 68°F		Cooling EWT 59°F		Heating EWT 50°F		Cooling Brine Full Load 77°F Part Load 68°F		Heating Brine Full Load 32°F Part Load 41°F	
			gpm	cfm	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP
PSC Motor	009	Single	3.0	350	9,600	14.5	13,200	5.2	10,800	22.2	10,600	4.4	9,800	16.7	7,800	3.4
	012	Single	3.5	400	12,300	15.7	14,800	5.1	14,500	25.5	12,300	4.5	13,000	18.0	9,600	3.7
	015	Single	4.0	500	14,400	15.9	18,500	5.3	16,700	26.0	15,500	4.5	15,000	18.0	12,000	3.8
	018	Single	5.0	600	18,000	15.6	23,000	5.1	21,000	25.5	19,000	4.4	18,500	18.0	14,700	3.8
	022	Single	8.0	850	20,600	17.2	25,000	6.0	23,000	28.0	19,800	5.0	21,200	20.3	15,000	3.8
	030	Single	8.0	900	28,100	18.2	32,700	5.5	30,900	27.1	25,800	4.8	29,200	21.1	19,800	3.8
	036	Single	9.0	1200	34,100	17.6	37,900	5.6	36,300	25.7	30,300	4.7	34,600	19.6	24,100	4.0
	042	Single	11.0	1300	40,100	16.6	44,100	5.3	44,600	24.5	34,900	4.6	41,600	18.6	27,500	3.7
	048	Single	12.0	1500	46,400	15.5	55,400	5.0	51,600	22.5	45,100	4.3	48,900	17.3	35,300	3.6
	060	Single	15.0	1800	64,000	16.0	69,800	5.1	71,700	24.6	55,100	4.4	66,800	18.5	43,200	3.7
	070	Single	18.0	2000	70,600	15.1	84,300	4.7	77,500	21.6	66,100	4.0	73,200	17.2	52,000	3.4
ECM Motor	026	Full	8.0	950	26,000	16.0	31,000	5.5	29,000	24.0	25,300	5.0	27,200	18.6	19,500	4.2
		Part	7.0	750	19,500	18.6	22,600	6.3	22,000	31.2	18,100	5.4	21,500	26.8	16,200	4.7
	038	Full	9.0	1200	39,000	17.2	42,200	5.5	39,400	24.1	34,800	5.0	40,200	20.1	27,000	4.2
		Part	8.0	1000	28,000	20.1	30,300	6.5	30,500	32.1	24,800	5.4	30,100	30.0	22,300	5.1
	049	Full	12.0	1500	48,300	15.8	57,400	5.1	53,200	22.7	47,200	4.7	50,000	18.0	37,400	4.1
		Part	11.0	1300	35,900	18.1	41,900	6.1	37,800	28.3	34,000	5.2	38,700	25.1	31,000	4.7
	064	Full	16.0	1800	64,500	16.2	72,500	5.1	70,700	22.7	56,800	4.6	67,600	18.0	45,800	3.9
		Part	14.0	1500	47,000	18.2	51,500	5.8	51,500	29.3	39,600	4.8	51,100	25.6	36,000	4.2
	072	Full	18.0	2000	71,000	15.0	86,700	5.0	79,900	20.4	67,900	4.4	73,600	16.8	54,100	3.8
		Part	16.0	1500	54,000	16.6	63,400	5.4	62,200	26.0	51,000	4.6	58,800	23.1	45,000	4.3
	015	Single	4.0	500	14,400	16.5	18,500	5.3	16,700	27.0	15,500	4.7	15,000	18.8	12,000	4.0
	018	Single	5.0	600	18,000	16.5	23,000	5.3	21,000	26.8	19,000	4.7	18,500	19.0	14,700	4.1
	022	Single	8.0	850	20,700	17.5	25,300	6.2	23,500	30.0	19,800	5.3	21,700	21.0	15,000	4.0
	030	Single	8.0	900	28,300	19.2	32,700	5.8	31,300	28.8	25,800	5.0	29,400	21.9	20,000	4.0
	036	Single	9.0	1200	34,500	19.6	38,000	6.1	37,200	30.1	30,300	5.2	35,000	22.0	24,100	4.4
	042	Single	11.0	1300	40,600	19.2	44,100	5.9	45,200	29.5	34,900	5.2	42,000	21.4	27,500	4.2
	048	Single	12.0	1500	47,000	17.5	55,400	5.5	52,000	26.1	45,100	4.8	49,300	19.7	35,300	4.0
	060	Single	15.0	1800	64,300	17.2	69,800	5.4	72,000	26.1	55,100	4.7	66,800	19.5	43,200	3.9
	070	Single	18.0	2000	70,600	16.0	84,300	5.1	79,100	23.8	66,100	4.4	73,200	18.2	52,000	3.7

01/15/08

Cooling capacities based upon 80.6°F DB, 66.2°F WB entering air temperature

Heating capacities based upon 68°F DB, 59°F WB entering air temperature

All ratings based upon 208V operation

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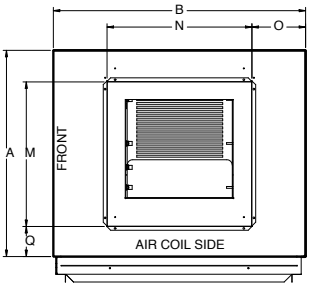
ANSI/AHRI/ASHRAE/ISO13256-1

Vertical Dimensional Data

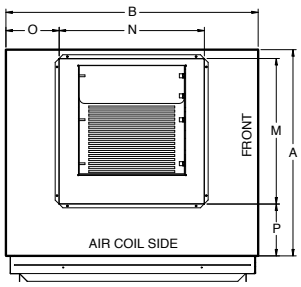
Top Air Discharge

Legend

AP	Alternate Service Panel
BP	Blower Service Panel
CP	Control Access Panel
CMP	Compressor Service Panel

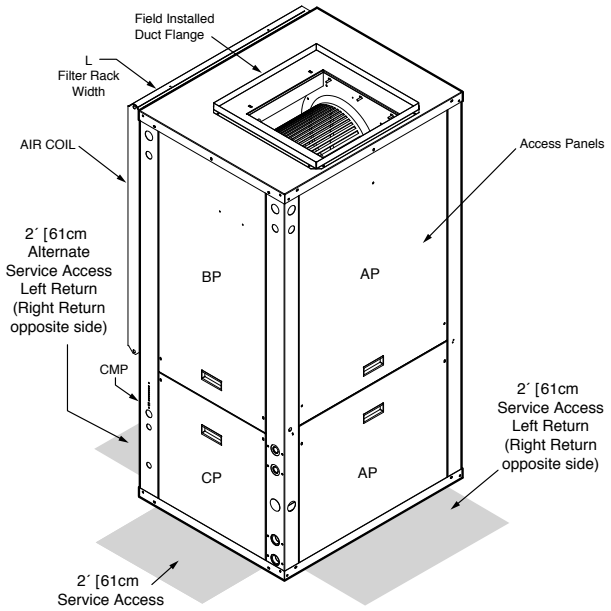


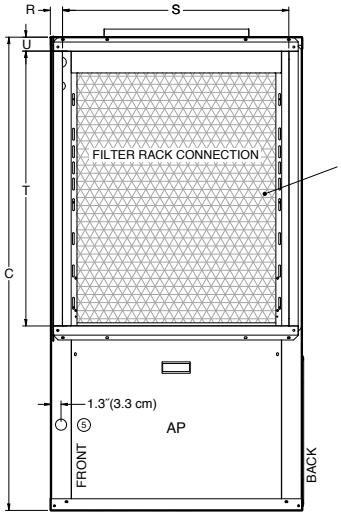
TOP V EW - R GHT RETURN



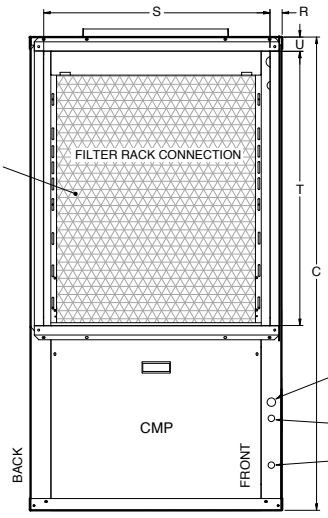
TOP V EW - LEFT RETURN

LEFT RETURN

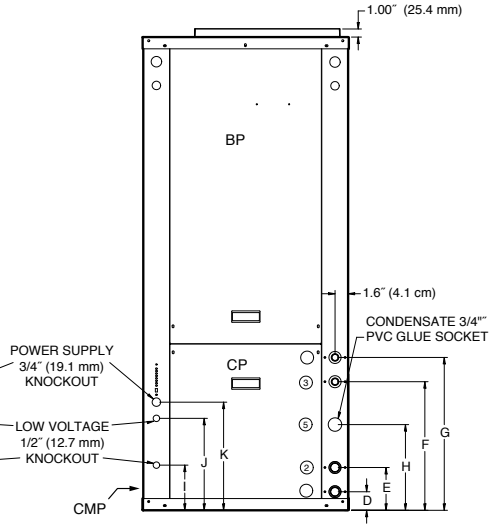




R GHT V EW - R GHT RETURN



LEFT V EW - LEFT RETURN



FRONT V EW

Vertical Models		Overall Cabinet			Water Connections							Electrical Knockouts			L	Discharge Connection duct flange installed (±0.10 in)					Return Connection using std deluxe filter rack (±0.10 in)			
		A	B	C	1 D	2 E	3 F	4 G	5 H	Loop		I 1/2" cond	J 1/2" cond	K 3/4" cond		M	N	O	P	Q	R	S	T	U
		Width	Depth	Height*	In	Out	HWG In	HWG Out	Cond-ensate	Water FPT	HWG FPT	Low Voltage	Ext Pump	Power Supply	Filter Rack Width	Supply Width	Supply Depth					Return Depth	Return Height	
009-012	in.	22.2	22.5	34.5	2.3	5.3	11.9	14.9	8.6	1/2"	1/2"	3.8	9.7	11.7	2.2	10.0	10.0	6.1	8.8	11.8	1.3	18.1	14.2	1.7
	cm.	56.4	57.2	87.6	5.9	13.5	30.2	37.8	21.8	12.7 mm	12.7 mm	9.7	24.6	29.7	5.5	25.4	25.4	15.5	22.4	30.0	3.3	46.0	36.1	4.4
015-018	in.	22.5	26.5	39.4	2.3	5.3	13.4	16.4	9.6	3/4"	1/2"	5.1	10.8	12.8	2.2	14.0	14.0	6.3	7.8	5.9	2.3	22.0	18.0	2.0
	cm.	57.2	67.3	100.1	5.8	13.5	34.0	41.7	24.3	19.05 mm	12.7 mm	13.0	27.4	32.5	5.5	35.6	35.6	16.0	19.8	14.9	5.8	55.9	45.7	5.1
022-030	in.	22.5	26.5	48.4	2.3	5.3	13.4	16.4	9.6	3/4"	1/2"	5.1	10.8	12.8	2.2	14.0	14.0	6.3	7.8	5.9	2.3	22.0	26.0	2.0
	cm.	57.2	67.3	122.9	5.8	13.5	34.0	41.7	24.3	19.05 mm	12.7 mm	13.0	27.4	32.5	5.5	35.6	35.6	16.0	19.8	15.0	5.8	55.9	66.0	5.1
036-072	in.	25.5	31.2	58.4	3.0	5.3	15.9	18.9	10.6	1"	1/2"	5.6	11.4	13.4	2.2	18.0	18.0	6.6	6.5	3.7	1.6	28.1	34.0	1.7
	cm.	64.8	79.2	148.3	7.6	13.5	40.4	48.0	26.9	25.4 mm	12.7 mm	14.2	29.0	34.0	5.5	45.7	45.7	16.8	16.5	9.4	4.1	71.4	86.4	4.3

Condensate is 3/4" PVC female glue socket and is switchable from side to front

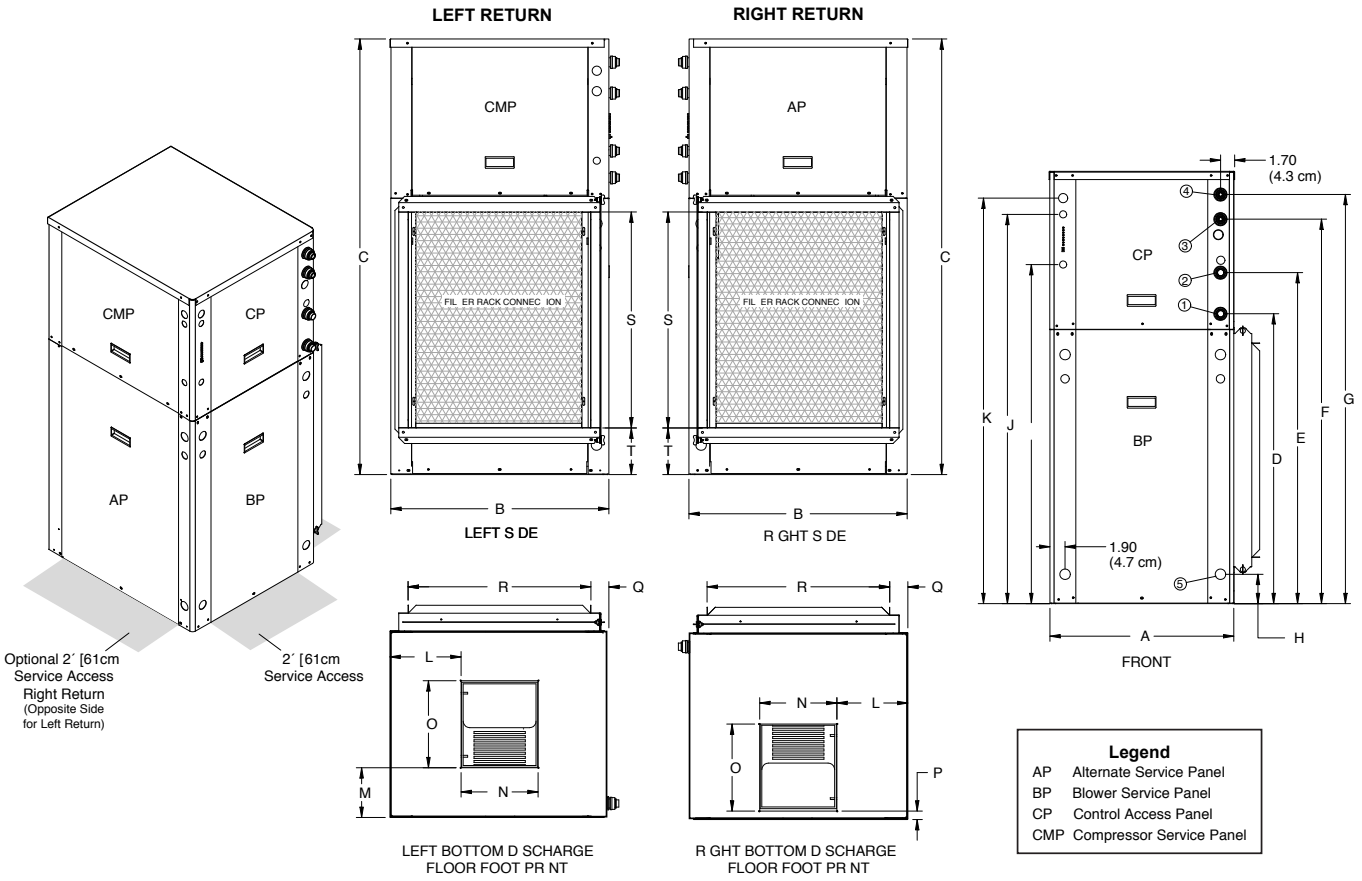
Vertical unit shipped with 1" (field adjustable to 2") duct collar/filter rack extending from unit 3.25" and is suitable for duct connection.

Discharge flange is field installed and extends 1" (25.4 mm) from cabinet

Rev.: 05/30/07 B

Vertical Dimensional Data

Bottomflow



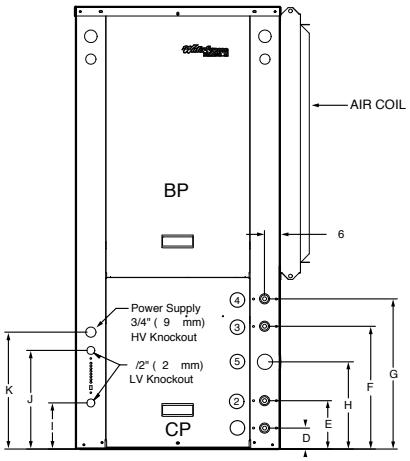
Bottomflow Models		Overall Cabinet			Water Connections							Electrical Knockouts			Discharge Connection (duct flange installed (±0.10 in)					Return Connection (using std deluxe filter rack (±0.10 in)			
		A	B	C	1 D	2 E	3 F	4 G	5 H	Loop		I	J	K	L	M	N	O	P	Q	R	S	T
		Width	Depth	Height	In	Out	HWG In	HWG Out	Condensate	Water FPT	HWG FPT	1/2" cond Low Voltage	1/2" cond Ext Pump	3/4" cond Power Supply			Supply Width	Supply Depth			Return Depth	Return Height	
022-030	in.	22.5	26.5	52.5	35.3	40.2	46.7	49.7	3.6	3/4"	1/2"	41.9	43.6	45.1	8.6	6.0	9.3	10.5	1.0	2.2	22.2	26.0	5.6
	cm.	57.2	67.3	133.4	89.7	102.1	118.6	126.2	9.1	19.05 mm	12.7 mm	106.4	110.7	114.6	21.8	15.2	23.6	26.7	2.5	5.6	56.4	66.0	14.2
036-072	in.	25.5	31.5	62.5	43.4	48.4	57.0	60.0	3.6	1"	1/2"	48.9	50.8	52.2	9.1	4.8	13.4	13.6	1.5	1.8	28.1	34.0	5.6
	cm.	64.8	80.0	158.8	110.2	122.9	144.8	152.4	9.1	25.4 mm	12.7 mm	124.2	129.0	132.6	23.1	12.2	34.0	34.5	3.8	4.6	71.4	86.4	14.2

Rev. 11/07/07

Condensate is 3/4" PVC female glue socket and is switchable from side to front
Vertical bottomflow unit shipped with deluxe 1" (field adjustable to 2") duct collar/filter rack extending from unit 3.25" and is suitable for duct connection.
Water connections extend 1.2" (30.5mm) beyond front of cabinet.
036 - 072 bottomflow units use 30" x 36" air filter

Vertical Dimensional Data

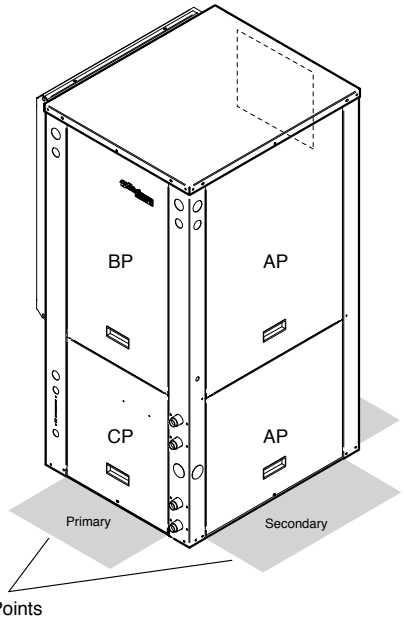
Rear Air Discharge

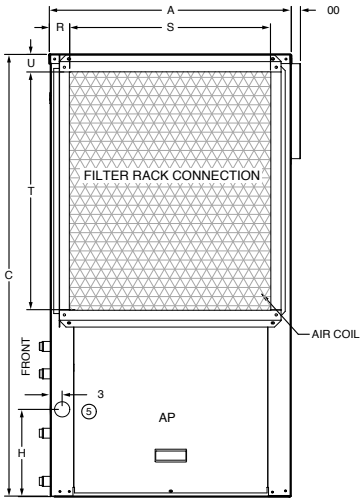


FRONT V EW
Right Return

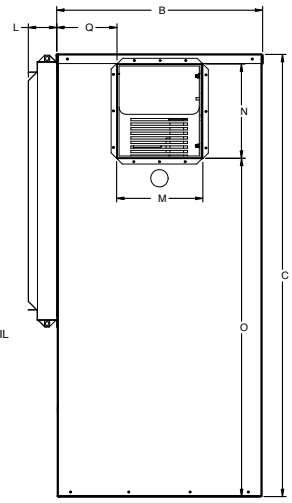
Legend

AP	Alternate Service Panel
BP	Blower Service Panel
CP	Control Access Panel
CMP	Compressor Service Panel

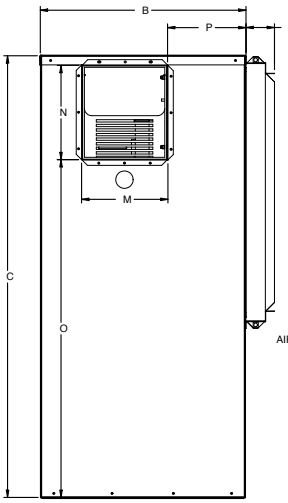




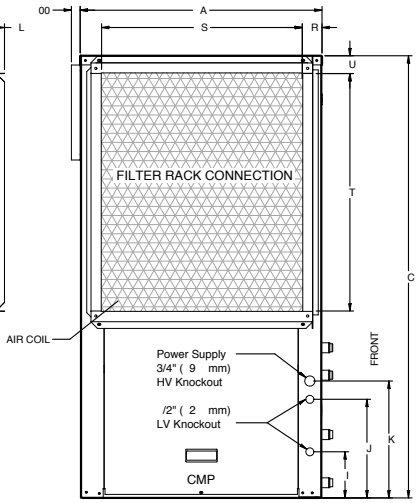
S DE V EW
Right Return



REAR V EW
Right Return



REAR V EW
Left Return



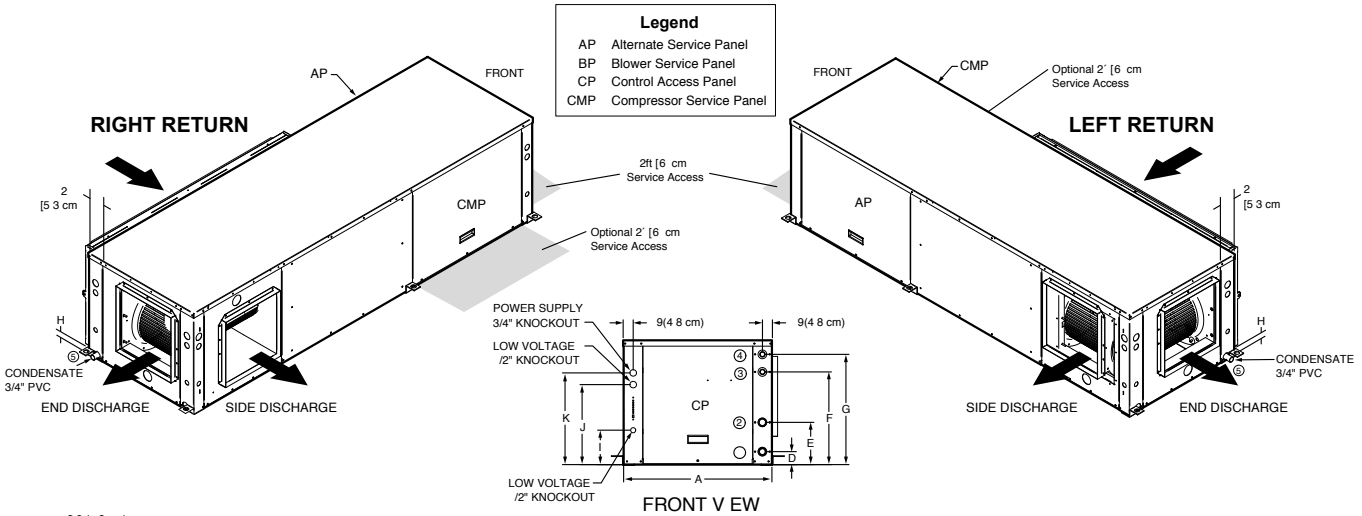
S DE V EW
Left Return

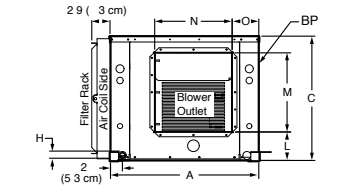
Vertical Models		Overall Cabinet			Water Connections							Electrical Knockouts			L	Discharge Connection duct flange installed (±0.10 in)					Return Connection using std deluxe filter rack (±0.10 in)			
					1	2	3	4	5			I	J	K										
		A	B	C	D	E	F	G	H	Loop		1/2" cond	1/2" cond	3/4" cond		M	N	O	P	Q	R	S	T	U
		Width	Depth	Height*	In	Out	HWG In	HWG Out	Cond-ensate	Water FPT	HWG FPT	Low Voltage	Ext Pump	Power Supply	Filter Rack Width	Supply Width	Supply Depth					Return Depth	Return Height	
022-030	in.	22.5	26.5	48.4	2.3	5.3	13.4	16.4	9.6	3/4"	1/2"	5.1	10.8	12.8	2.2	9.5	10.4	37.0	8.5	6.5	2.3	22.0	26.0	2.0
	cm.	57.2	67.3	122.9	5.8	13.5	34.0	41.7	24.3	19.05 mm	12.7 mm	13.0	27.4	32.5	5.5	24.1	26.4	94.0	21.6	16.5	5.8	55.9	66.0	5.1
036-072	in.	25.5	31.2	58.4	3.0	5.3	15.9	18.9	10.6	1"	1/2"	5.6	11.4	13.4	2.2	13.3	13.6	43.4	9.1	8.1	1.6	28.1	34.0	1.7
	cm.	64.8	79.2	148.3	7.6	13.5	40.4	48.0	26.9	25.4 mm	12.7 mm	14.2	29.0	34.0	5.5	33.8	34.5	110.2	23.1	20.6	4.1	71.4	86.4	4.3

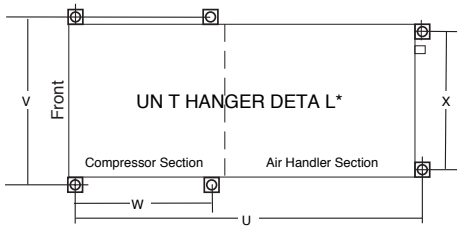
Condensate is 3/4" PVC female glue socket and is switchable from side to front
Vertical unit shipped with 1" (field adjustable to 2") duct collar/filter rack extending from unit 3.25" and is suitable for duct connection.
Discharge flange is field installed and extends 1" (25.4 mm) from cabinet

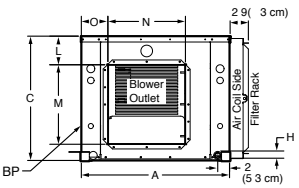
Rev.: 05/30/07 B

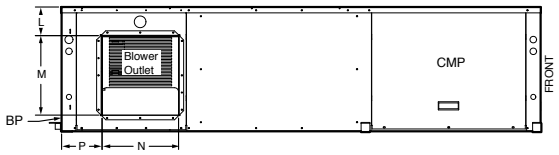
Horizontal Dimensional Data

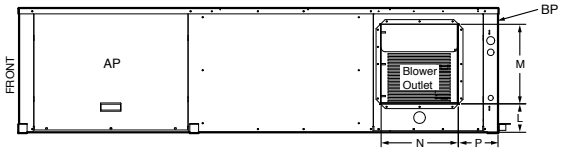


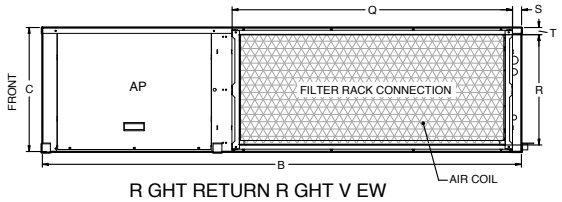


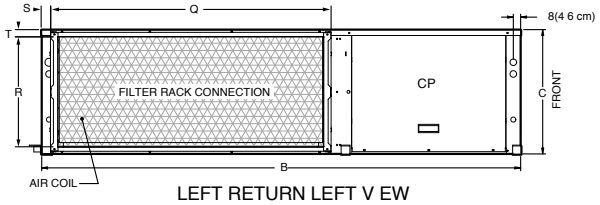












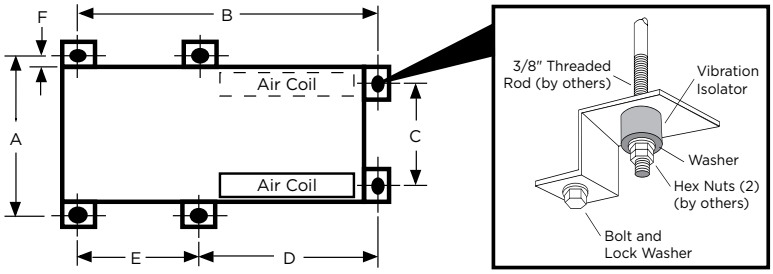
NOTE: *Only models 009 - 030 require our (4) hangers.

Horizontal Models		Overall Cabinet			Water Connections							Electrical Knockouts			Discharge Connection duct flange installed (±0.10 in)					Return Connection using std deluxe filter rack (±0.10 in)				Unit Hanger Dimensions			
		A	B	C	1 D	2 E	3 F	4 G	5 H	Loop		I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
		Width	Depth	Height*	In	Out	HWG In	HWG Out	Cond-ensate	Water FPT	HWG FPT	1/2" cond Low Voltage	1/2" cond Ext Pump	3/4" cond Power Supply		Supply Height	Supply Depth			Return Depth	Return Height						
009-012	in.	22.5	44.0	17.3	2.3	5.3	11.9	14.9	0.8	1/2"	1/2"	3.8	9.7	11.7	5.9	7.3	9.7	5.8	5.8	20.3	16.4	0.5	0.4	44.8	25.1	21.0	21.4
	cm.	57.2	111.8	43.9	5.8	13.5	30.2	37.8	2.1	12.7 mm	12.7 mm	9.7	24.6	29.7	15.0	18.5	24.6	14.7	14.7	51.6	41.7	1.3	1.0	113.7	63.7	53.3	54.4
015-018	in.	22.5	53.0	19.3	2.3	5.3	13.8	16.8	0.8	3/4"	1/2"	5.9	11.6	13.6	7.0	10.5	9.5	8.2	8.2	24.3	18.1	1.0	0.6	53.8	25.1	25.0	21.4
	cm.	57.2	134.6	49.0	5.8	13.5	35.1	42.7	2.1	19.05 mm	12.7 mm	14.9	29.5	34.5	17.8	26.7	24.1	20.8	20.8	61.7	46.0	2.5	1.5	136.5	63.7	63.5	54.4
022-030	in.	22.5	63.0	19.3	2.3	5.3	13.8	13.8	0.8	3/4"	1/2"	5.9	13.7	15.7	6.5	10.5	9.4	6.5	5.8	30.5	16.9	2.8	1.7	63.4	24.8	25.3	21.1
	cm.	57.2	160.0	49.0	5.8	13.5	35.1	35.1	2.1	19.05 mm	12.7 mm	14.9	34.7	39.8	16.6	26.5	23.8	16.5	14.6	77.3	42.9	7.1	4.4	161.0	63.0	64.3	53.6
036-038	in.	25.5	72.0	21.3	2.2	7.2	15.8	18.8	0.8	1"	1/2"	5.9	13.7	15.7	4.9	13.6	13.2	4.6	6.8	35.5	18.9	2.8	1.7	72.4	27.8	29.3	24.1
	cm.	64.8	182.9	54.1	5.6	18.3	40.2	47.8	2.1	25.4 mm	12.7 mm	14.9	34.7	39.8	12.4	34.6	33.5	11.6	17.2	90.0	47.9	7.1	4.4	183.9	70.6	74.4	61.2
042-049	in.	25.5	77.0	21.3	2.2	7.2	15.8	18.8	0.8	1"	1/2"	5.9	13.7	15.7	4.9	13.6	13.2	4.6	6.8	40.5	18.9	2.8	1.7	77.4	27.8	29.3	24.1
	cm.	64.8	195.6	54.1	5.6	18.3	40.2	47.8	2.1	25.4 mm	12.7 mm	14.9	34.7	39.8	12.4	34.6	33.5	11.6	17.2	102.7	47.9	7.1	4.4	196.6	70.6	74.4	61.2
060-072	in.	25.5	82.0	21.3	2.2	7.2	15.8	18.8	0.8	1"	1/2"	5.9	13.7	15.7	4.9	13.6	13.2	4.6	6.8	45.5	18.9	2.8	1.7	82.4	27.8	29.3	24.1
	cm.	64.8	208.3	54.1	5.6	18.3	40.2	47.8	2.1	25.4 mm	12.7 mm	14.9	34.7	39.8	12.4	34.6	33.5	11.6	17.2	115.4	47.9	7.1	4.4	209.3	70.6	74.4	61.2

Horizontal unit shipped with 1" (field adjustable to 2") duct collar/filter rack extending from unit 2.88" and is suitable for duct connection.
Discharge flange is field installed and extends 1" (25.4 mm) from cabinet

Rev. 05/30/07 B

Hanger Bracket Locations



Model	A	B	C	D	E	F
009 - 012*	25.1	44.7	21.4	N/A	N/A	1.3
015 - 018*	25.1	53.7	21.4	N/A	N/A	1.3
022 - 030*	24.8	63.4	21.1	N/A	N/A	1.1
036 - 038	27.8	72.4	24.1	43.1	29.3	1.1
042 - 049	27.8	77.4	24.1	48.1	29.3	1.1
060 - 072	27.8	82.4	24.1	53.1	29.3	1.1

NOTE: *Only the four corner brackets are needed on sizes 009-030.

Unit Operating Limits

Operating Limits	**Cooling**		**Heating**	
	(°F)	**(°C)**	**(°F)**	**(°C)**
Air Limits				
Min. Ambient Air	45	7.2	45	7.2
Rated Ambient Air	80	26.7	70	21.1
Max. Ambient Air	100	37.8	85	29.4
Min. Entering Air	50	10.0	40	4.4
Rated Entering Air db/wb	80.6/66.2	27/19	68	20.0
Max. Entering Air db/wb	110/83	43/28.3	80	26.7
Water Limits				
Min. Entering Water	30	-1.1	20	-6.7
Normal Entering Water	50-110	10-43.3	30-70	-1.1
Max. Entering Water	120	48.9	90	32.2

Notes:

Minimum/maximum limits are only for start-up conditions, and are meant for bringing the space up to occupancy temperature. Units are not designed to operate at the minimum/maximum conditions on a regular basis. The operating limits are dependant upon three primary factors: 1) water temperature, 2) return air temperature, and 3) ambient temperature. When any of the factors are at the minimum or maximum levels, the other two factors must be at the normal level for proper and reliable unit operation.

Physical Data - Single Speed

Model		SINGLE SPEED										
		NS009	NS012	NS015	NS018	NS022	NS030	NS036	NS042	NS048	NS060	NS070
Compressor (1 each)		LG Rotary				Copeland Scroll						
Factory Charge R410a, oz [kg] Vertical		29 [0.82]	42 [1.19]	38 [1.08]	40 [1.13]	58 [1.64]	62 [1.76]	82 [2.32]	82 [2.32]	98 [2.78]	110 [3.12]	146 [4.14]
Factory Charge R410a, oz [kg] Horizontal		29 [0.82]	42 [1.19]	38 [1.08]	40 [1.13]	60 [1.70]	66 [1.87]	82 [2.32]	82 [2.32]	98 [2.78]	94 [2.67]	122 [3.46]
Fan Motor & Blower												
Fan Motor Type/Speeds	ECM	Not Available		ECM Variable Speed								
	PSC	PSC 4 Speeds		PSC 3 Speeds								
Fan Motor- hp [W]	ECM	Not Available		1/2 [373]	1/2 [373]	1/2 [373]	1/2 [373]	1/2 [373]	1/2 [373]	1/2 [373]	1 [746]	1 [746]
	PSC	1/10 [75]	1/10 [75]	1/6 [134]	1/6 [134]	1/5 [149]	1/3 [249]	1/2 [373]	1/2 [373]	1/2 [373]	1 [746]	1 [746]
Optional - Oversized PSC Fan Motor - hp [W]	PSC	Not Available				1/3 [249]	1/2 [373]	1/2 [373]	3/4 [560]	3/4 [560]	Not Available	Not Available
Blower Wheel Size (Dia x W), in. [mm]	ECM	Not Available		9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	11 x 10 [279 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]
	PSC	6 x 8 [152 x 203]	6 x 8 [152 x 203]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	10 x 10 [254 x 254]	10 x 10 [254 x 254]	10 x 10 [254 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]
Coax and Water Piping												
Water Connections Size - FPT - in [mm]		1/2" [12.7]	1/2" [12.7]	3/4" [19.05]	3/4" [19.05]	3/4" [19.05]	3/4" [19.05]	1" [25.4]	1" [25.4]	1" [25.4]	1" [25.4]	1" [25.4]
HWG Connection Size - FPT - in [mm]		Not Available			1/2" [12.7]	1/2" [12.7]	1/2" [12.7]	1/2" [12.7]	1/2" [12.7]	1/2" [12.7]	1/2" [12.7]	1/2" [12.7]
Coax & Piping Water Volume - gal [l]		0.18 [0.7]	0.35 [1.3]	0.40 [1.5]	0.40 [1.5]	0.7 [2.6]	1.0 [3.8]	1.3 [4.9]	1.3 [4.9]	1.6 [6.1]	1.6 [6.1]	2.3 [8.7]
Vertical												
Air Coil Dimensions (H x W), in. [mm]		12 x 16 [305 x 406]	16 x 16 [406 x 406]	19 x 20 [483 x 508]	19 x 20 [483 x 508]	28 x 20 [711 x 542]	28 x 20 [711 x 542]	28 x 25 [711 x 635]	32 x 25 [813 x 635]	32 x 25 [813 x 635]	36 x 25 [914 x 635]	36 x 25 [914 x 635]
Air Coil Total Face Area, ft2 [m2]		1.3 [0.121]	1.8 [0.167]	2.6 [0.242]	2.6 [0.242]	3.9 [0.362]	3.9 [0.362]	4.9 [0.451]	5.6 [0.570]	5.6 [0.570]	6.3 [0.641]	6.3 [0.641]
Air Coil Tube Size, in [mm]		5/16 [7.9]	3/8 [9.5]	5/16 [7.9]	5/16 [7.9]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]
Air Coil Number of rows		3	3	3	3	3	3	3	3	3	4	4
Filter Standard - 1" [24mm] Pleated MERV8 Throwaway, in [mm]		16 x 20 [406 x 508]	16 x 20 [406 x 508]	20 x 22 [508 x 559]	20 x 22 [508 x 559]	28 x 24 [712 x 610]	28 x 24 [712 x 610]	30 x 36 [762 x 914]	30 x 36 [762 x 914]	30 x 36 [762 x 914]	30 x 36 [762 x 914]	30 x 36 [762 x 914]
Weight - Operating, lb [kg]		145 [66]	175 [79]	200 [91]	210 [95]	303 [137]	318 [144]	363 [165]	378 [171]	418 [189]	453 [205]	478 [217]
Weight - Packaged, lb [kg]		152 [69]	185 [84]	210 [95]	220 [100]	313 [142]	328 [149]	373 [169]	388 [176]	428 [194]	463 [210]	488 [221]
Horizontal												
Air Coil Dimensions (H x W), in. [mm]		12 x 16 [305 x 406]	16 x 16 [406 x 406]	18 x 21 [457 x 533]	18 x 21 [457 x 533]	18 x 30 [457 x 762]	18 x 30 [457 x 762]	20 x 35 [508 x 889]	20 x 40 [508 x 1016]	20 x 40 [508 x 1016]	20 x 45 [508 x 1143]	20 x 45 [508 x 1143]
Air Coil Total Face Area, ft2 [m2]		1.3 [0.121]	1.8 [0.167]	2.6 [0.242]	2.6 [0.242]	3.9 [0.362]	3.9 [0.362]	4.9 [0.451]	5.6 [0.570]	5.6 [0.570]	6.3 [0.641]	6.3 [0.641]
Air Coil Tube Size, in [mm]		5/16 [7.9]	3/8 [9.5]	5/16 [7.9]	5/16 [7.9]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]
Air Coil Number of rows		3	3	3	3	3	3	3	3	3	3	3
Filter Standard - 1" [25mm] Pleated MERV8 Throwaway, in [mm]		16 x 20 [406 x 508]	16 x 20 [406 x 508]	18 x 24 [457 x 610]	18 x 24 [457 x 610]	18 x 32 [457 x 813]	1 - 18 x 32 [457 x 813]	1 - 20 x 37 [686 x 940]	1 - 20 x 20 [508 x 508] 1 - 20 x 22 [508 x 559]	1 - 20 x 20 [508 x 508] 1 - 20 x 22 [508 x 559]	1 - 20 x 25 [508 x 635] 1 - 20 x 22 [508 x 559]	1 - 20 x 25 [508 x 635] 1 - 20 x 22 [508 x 559]
Weight - Operating, lb [kg]		145 [66]	175 [79]	200 [91]	210 [95]	305 [138]	320 [145]	368 [167]	383 [174]	423 [192]	458 [208]	483 [219]
Weight - Packaged, lb [kg]		152 [69]	185 [84]	210 [95]	220 [100]	320 [145]	335 [152]	383 [174]	398 [180]	438 [199]	473 [214]	498 [226]

Physical Data - Dual Capacity

Model	DUAL CAPACITY				
	ND026	ND038	ND049	ND064	ND072
Compressor (1 each)	Copeland 2-speed Scroll, UltraTech				
Factory Charge R410a, oz [kg] Vertical	62 [1.76]	78 [2.21]	89 [2.52]	122 [3.46]	140 [3.97]
Factory Charge R410a, oz [kg] Horizontal	60 [1.70]	76 [2.16]	89 [2.52]	124 [3.52]	160 [4.54]
ECM Fan Motor & Blower					
Fan Motor Type/Speeds	ECM Variable Speed				
Fan Motor- hp [W]	1/2 [373]	1/2 [373]	1/2 [373]	1 [746]	1 [746]
Blower Wheel Size (Dia x W), in. [mm]	9 x 7 [229 x 178]	11 x 10 [279 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]
Coax and Water Piping					
Water Connections Size - FPT - in [mm]	3/4" [19.05]	1" [25.4]	1" [25.4]	1" [25.4]	1" [25.4]
HWG Connection Size - FPT - in [mm]	1/2" [12.7]	1/2" [12.7]	1/2" [12.7]	1/2" [12.7]	1/2" [12.7]
Coax & Piping Water Volume - gal [l]	0.7 [2.6]	1.3 [4.9]	1.6 [6.1]	1.6 [6.1]	2.3 [8.7]
Vertical					
Air Coil Dimensions (H x W), in. [mm]	28 x 20 [711 x 542]	28 x 25 [711 x 635]	32 x 25 [813 x 635]	36 x 25 [914 x 635]	36 x 25 [914 x 635]
Air Coil Total Face Area, ft2 [m2]	3.9 [0.362]	4.9 [0.451]	5.6 [0.570]	6.3 [0.641]	6.3 [0.641]
Air Coil Tube Size, in [mm]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]
Air Coil Number of rows	3	3	3	4	4
Filter Standard - 1" [25mm] Pleated MERV8 Throwaway, in [mm]	28 x 24 [712 x 610]	30 x 36 [762 x 914]	30 x 36 [762 x 914]	30 x 36 [762 x 914]	30 x 36 [762 x 914]
Weight - Operating, lb [kg]	303 [137]	368 [167]	418 [189]	463 [210]	478 [217]
Weight - Packaged, lb [kg]	313 [142]	378 [171]	428 [194]	473 [214]	488 [221]
Horizontal					
Air Coil Dimensions (H x W), in. [mm]	18 x 30 [457 x 762]	20 x 35 [508 x 889]	20 x 40 [508 x 1016]	20 x 45 [508 x 1143]	20 x 45 [508 x 1143]
Air Coil Total Face Area, ft2 [m2]	3.9 [0.362]	4.9 [0.451]	5.6 [0.570]	6.3 [0.641]	6.3 [0.641]
Air Coil Tube Size, in [mm]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]
Air Coil Number of rows	3	3	3	4	4
Filter Standard - 1" [25mm] Pleated MERV8 Throwaway, in [mm]	1 - 18 x 32 [457 x 813]	1 - 20 x 37 [686 x 940]	1 - 20 x 20 [508 x 508] 1 - 20 x 22 [508 x 559]	1 - 20 x 25 [508 x 635] 1 - 20 x 22 [508 x 559]	1 - 20 x 25 [508 x 635] 1 - 20 x 22 [508 x 559]
Weight - Operating, lb [kg]	305 [138]	373 [169]	423 [192]	468 [212]	483 [219]
Weight - Packaged, lb [kg]	320 [145]	388 [176]	438 [199]	483 [219]	498 [226]

Unit Electrical Data

ECM Motor

Model	Rated Voltage	Voltage Min/Max	Compressor				Fan Motor FLA	Total Unit FLA	Min Circ Amp	Max Fuse/ HACR
			MCC	RLA	LRA	LRA**				
NS015	208 230/60/1	197/253	na	6.2	29.0	n/a	4.0	10.2	11.8	15
	265/60/1	238/292	na	5.6	28.0	n/a	4.1	9.7	11.1	15
NS018	208 230/60/1	197/253	na	8.4	33.5	n/a	4.0	12.4	14.5	20
	265/60/1	238/292	na	7.3	28.0	n/a	4.1	11.4	13.2	20
NS022	208 230/60/1	197/253	14.0	9.0	48.0	17.0	4.0	13.0	15.2	20
	265/60/1	238/292	13.0	8.3	40.0	n/a	4.1	12.4	14.5	20
NS030	208 230/60/1	197/253	20.0	12.8	58.3	21.0	4.0	16.8	20.0	30
	265/60/1	238/292	14.9	9.5	87.0	n/a	4.1	13.6	16.0	25
NS036	208 230/60/1	197/253	22.0	14.1	73.0	26.0	4.0	18.1	21.6	35
	265/60/1	238/292	17.5	11.2	60.0	n/a	4.1	15.3	18.1	25
	208 230/60/3	187/253	13.9	8.9	58.0	n/a	4.0	12.9	15.1	20
	460/60/3	414/506	6.5	4.2	28.0	n/a	4.1	8.3	9.4	10
NS036*	208 230/60/1	197/253	22.0	14.1	73.0	26.0	7.0	21.1	24.6	35
	265/60/1	238/292	17.5	11.2	60.0	n/a	6.9	18.1	20.9	30
	208 230/60/3	187/253	13.9	8.9	58.0	n/a	7.0	15.9	18.1	25
	460/60/3	414/506	6.5	4.2	28.0	n/a	6.9	11.1	12.2	15
NS042	208 230/60/1	197/253	26.0	16.6	79.0	28.0	4.0	20.6	24.8	40
	208 230/60/3	187/253	16.3	10.4	73.0	n/a	4.0	14.4	17.0	25
	460/60/3	414/506	9.0	5.8	38.0	n/a	4.1	9.9	11.3	15
NS042*	208 230/60/1	197/253	26.0	16.6	79.0	28.0	7.0	23.6	27.8	40
	208 230/60/3	187/253	16.3	10.4	73.0	n/a	7.0	17.4	20.0	30
	460/60/3	414/506	9.0	5.8	38.0	n/a	6.9	12.7	14.1	15
NS048	208 230/60/1	197/253	31.0	19.8	109.0	38.0	4.0	23.8	28.8	45
	208 230/60/3	187/253	21.2	13.6	83.1	n/a	4.0	17.6	21.0	30
	460/60/3	414/506	9.5	6.1	41.0	n/a	4.1	10.2	11.7	15
NS048*	208 230/60/1	197/253	31.0	19.8	109.0	38.0	7.0	26.8	31.8	50
	208 230/60/3	187/253	21.2	13.6	83.1	n/a	7.0	20.6	24.0	35
	460/60/3	414/506	9.5	6.1	41.0	n/a	6.9	13.0	14.5	20
NS060	208 230/60/1	197/253	41.2	26.4	134.0	47.0	7.0	33.4	40.0	60
	208 230/60/3	187/253	24.9	15.9	110.0	n/a	7.0	22.9	26.9	40
	460/60/3	414/506	12.1	7.7	52.0	n/a	6.9	14.6	16.6	20
NS070	208 230/60/1	197/253	47.0	30.1	158.0	55.0	7.0	37.1	44.6	70
	208 230/60/3	187/253	32.0	20.5	155.0	n/a	7.0	27.5	32.6	50
	460/60/3	414/506	15.0	9.6	75.0	n/a	6.9	16.5	18.9	25
ND026	208 230/60/1	197/253	16.0	10.2	52.0	18.0	4.0	14.2	16.8	25
ND038	208 230/60/1	197/253	26.0	16.6	82.0	29.0	4.0	20.6	24.8	40
	208 230/60/3	187/253	17.4	11.1	58.0	n/a	4.0	15.1	17.9	25
	460/60/3	414/506	7.0	4.5	29.0	n/a	4.1	8.6	9.7	10
ND038*	208 230/60/1	197/253	26.0	16.6	82.0	29.0	7.0	23.6	27.8	40
	208 230/60/3	187/253	17.4	11.1	58.0	n/a	7.0	18.1	20.9	30
	460/60/3	414/506	7.0	4.5	29.0	n/a	6.9	11.4	12.5	15
ND049	208 230/60/1	197/253	33.0	21.1	96.0	34.0	4.0	25.1	30.4	50
	208 230/60/3	187/253	21.0	13.4	88.0	n/a	4.0	17.4	20.8	30
	460/60/3	414/506	10.0	6.4	41.0	n/a	4.1	10.5	12.1	15
ND049*	208 230/60/1	197/253	33.0	21.1	96.0	34.0	7.0	28.1	33.4	50
	208 230/60/3	187/253	21.0	13.4	88.0	n/a	7.0	20.4	23.8	35
	460/60/3	414/506	10.0	6.4	41.0	n/a	6.9	13.3	14.9	20
ND064	208 230/60/1	197/253	40.0	25.6	118.0	41.0	7.0	32.6	39.0	60
	208 230/60/3	187/253	27.5	17.6	123.0	n/a	7.0	24.6	29.0	45
	460/60/3	414/506	14.0	9.0	62.0	n/a	6.9	15.9	18.1	25
ND072	208 230/60/1	197/253	42.5	27.2	150.0	53.0	7.0	34.2	41.0	60

HACR circuit breaker in USA only
* With optional 1 HP ECM2 motor
** With optional IntelliStart™, only available on 208 230/60/1

5/6/09

CAUTION: When installing a unit with an ECM blower motor in 460/60/3 voltage, a neutral wire is required to allow proper unit operation.

Unit Electrical Data

PSC Motor

Model	Rated Voltage	Voltage Min/Max	Compressor				Fan Motor FLA	Total Unit FLA	Min Circ Amp	Max Fuse/ HACR
			MCC	RLA	LRA	LRA**				
NS009	208 230/60/1	197/253	na	4.8	21.0	n/a	0.6	5.4	6.6	10
	265/60/1	238/292	na	4.3	22.0	n/a	0.6	4.9	6.0	10
NS012	208 230/60/1	197/253	na	5.9	25.0	n/a	0.6	6.5	8.0	10
	265/60/1	238/292	na	5.3	22.0	n/a	0.6	5.9	7.2	10
NS015	208 230/60/1	197/253	na	6.2	29.0	n/a	1.1	7.3	8.9	15
	265/60/1	238/292	na	5.6	28.0	n/a	1.0	6.6	8.0	10
NS018	208 230/60/1	197/253	na	8.4	33.5	n/a	1.1	9.5	11.6	20
	265/60/1	238/292	na	7.3	28.0	n/a	1.0	8.3	10.1	15
NS022	208 230/60/1	197/253	14.0	9.0	48.0	17.0	1.2	10.2	12.4	20
	265/60/1	238/292	13.0	8.3	40.0	n/a	1.1	9.4	11.5	15
NS022*	208 230/60/1	197/253	14.0	9.0	48.0	17.0	1.5	10.5	12.7	20
	265/60/1	238/292	13.0	8.3	40.0	n/a	2.0	10.3	12.4	20
NS030	208 230/60/1	197/253	20.0	12.8	58.3	21.0	1.5	14.3	17.5	30
NS030*	208 230/60/1	197/253	20.0	12.8	58.3	21.0	2.2	15.0	18.2	30
	265/60/1	238/292	14.9	9.5	87.0	n/a	2.0	11.5	13.9	20
NS036	208 230/60/1	197/253	22.0	14.1	73.0	26.0	2.8	16.9	20.4	30
	265/60/1	238/292	17.5	11.2	60.0	n/a	2.0	13.2	16.0	25
	208 230/60/3	187/253	13.9	8.9	58.0	n/a	2.8	11.7	13.9	20
	460/60/3	414/506	6.5	4.2	28.0	n/a	1.4	5.6	6.7	10
NS036*	208 230/60/1	197/253	22.0	14.1	73.0	26.0	3.5	17.6	21.1	35
	265/60/1	NOT AVAILABLE								
	208 230/60/3	187/253	13.9	8.896	58.0	n/a	3.5	12.396	14.6	20
	460/60/3	414/506	6.5	4.2	28.0	n/a	1.8	6.0	7.1	10
NS042	208 230/60/1	197/253	26.0	16.6	79.0	28.0	3.5	20.1	24.3	40
	208 230/60/3	187/253	16.3	10.4	73.0	n/a	3.5	13.9	16.5	25
	460/60/3	414/506	9.0	5.8	38.0	n/a	1.8	7.6	9.0	10
	575/60/3	517/633	5.9	3.8	36.5	n/a	1.4	5.2	6.1	10
NS042*	208 230/60/1	197/253	26.0	16.6	79.0	28.0	4.6	21.2	25.4	40
	208 230/60/3	187/253	16.3	10.4	73.0	n/a	4.6	15.0	17.6	25
	460/60/3	414/506	9.0	5.8	38.0	n/a	2.3	8.1	9.5	15
	575/60/3	517/633	5.9	3.8	36.5	n/a	1.9	1.9	6.6	10
NS048	208 230/60/1	197/253	31.0	19.8	109.0	38.0	3.5	23.3	28.3	45
	208 230/60/3	187/253	21.2	13.6	83.1	n/a	3.5	17.1	20.5	30
	460/60/3	414/506	9.5	6.1	41.0	n/a	1.8	7.9	9.4	15
	575/60/3	517/633	7.8	5.0	34.0	n/a	1.4	6.4	7.6	10
NS048*	208 230/60/1	197/253	31.0	19.8	109.0	38.0	4.6	24.4	29.4	45
	208 230/60/3	187/253	21.2	13.6	83.1	n/a	4.6	18.2	21.6	35
	460/60/3	414/506	9.5	6.1	41.0	n/a	2.3	8.4	9.9	15
	575/60/3	517/633	7.8	5.0	34.0	n/a	1.9	6.9	8.1	10
NS060	208 230/60/1	197/253	41.2	26.4	134.0	47.0	5.9	32.3	38.9	60
	208 230/60/3	187/253	24.9	15.9	110.0	n/a	5.9	21.8	25.8	40
	460/60/3	414/506	12.1	7.7	52.0	n/a	3.0	10.7	12.7	20
	575/60/3	517/633	8.9	5.7	38.9	n/a	1.9	7.6	9.0	10
NS070	208 230/60/1	197/253	47.0	30.1	158.0	55.0	5.9	36.0	43.5	70
	208 230/60/3	187/253	32.0	20.5	155.0	n/a	5.9	26.4	31.5	50
	460/60/3	414/506	15.0	9.6	75.0	n/a	3.0	12.6	15.0	20
	575/60/3	517/633	11.9	7.6	54.0	n/a	1.9	9.5	11.4	15

5/6/09

HACR circuit breaker in USA only
* With optional high static PSC motor
** With optional IntelliStart™, only available on 208 230/60/1

Auxiliary Heat Ratings

(208-230V & Premier Control Only)

Model	KW		Stages	BTU/HR		Min	Envision Series Compatibility						
	208V	230V		208V	230V	CFM	009-012	015	018	022	026 - 030	036 - 042	048 - 072
EAS(H)4	2.9	3.8	1	9,700	12,900	250	●						
EAM(H)5	3.6	4.8	1	12,300	16,300	450		●	●	●	●		
EAM(H)8	5.7	7.6	2	19,400	25,900	550			●	●	●		
EAM(H)10	7.2	9.6	2	24,600	32,700	650					●		
EAL(H)10	7.2	9.6	2	24,600	32,700	1100						●	●
EAL(H)15	10.8	14.4	3	36,900	49,100	1250						●	●
EAL(H)15-3	10.8	14.4	3	36,900	49,100	1250						●	●
EAL(H)20	14.4	19.2	4	49,200	65,500	1500							●

NOTE: "H" is used in part number for horizontal units

Auxiliary Heat Electrical Data

(208-230V & Premier Control Only)

Model	Supply Circuit	Heater Amps		Min Circuit Amp		Max Fuse (USA)		Max Fuse (CAN)		Max CKT BRK		Supply Wire	
		208 V	240 V	208 V	240 V	208 V	240 V	208 V	240 V	208 V	240 V	Min AWG	Max FT
EAS(H)4	Single	13.7	15.8	17.9	20.5	20	20	20	20	20	20	12	80
EAM(H)5	Single	17.3	20	26.7	30	30	30	30	30	30	30	10	90
EAM(H)8	Single	27.5	31.7	39.3	44.6	40	45	40	45	40	50	6	140
EAM(H)10	Single	34.7	40	48.3	55	50	60	50	60	50	60	6	120
EAL(H)10	Single	34.7	40	53.3	60	60	60	60	60	60	60	6*	110
EAL(H)15	Single	52.0	60	75	85	80	90	80	90	70	100	4*	120
	L1/L2	34.7	40	53.3	60	60	60	60	60	60	60	6*	110
	L3/L4	17.3	20	21.7	25	25	25	25	25	20	30	10	100
EAL(H)20	Single	69.3	80	96.7	110	100	110	100	110	100	100	2*	140
	L1/L2	34.7	40	53.3	60	60	60	60	60	60	60	6*	110
	L3/L4	34.7	40	43.3	50	45	50	45	50	40	50	6	130

Fan Performance Data

ECM Motor

Single Speed

MODEL	MAX ESP	AIR FLOW DIP SWITCH SETTINGS											
		1	2	3	4	5	6	7	8	9	10	11	12
015	0.50	300 L	**400**	**500 M**	**600 H**	**700**							
018	0.50	300	400 L	**500**	**600 M**	**700 H**	**800**						
022	0.50		400	500 L	**600 M**	**700**	**800 H**	**900**	1000	1100	1200		
030	0.50		400	500 L	600	**700 M**	**800**	**900 H**	**1000**	**1100**	1200		
036	0.50	650	750	850 L	1000	**1100 M**	**1200**	**1300 H**	**1400**	**1500**			
036 w/1hp*	0.75	800	1000 L	**1100 M**	**1300 H**	**1500**	**1600**	1800					
042	0.50	650	800	900 L	1050	**1150 M**	**1250**	**1350**	**1450 H**	**1550**			
042 w/1hp*	0.75	800	900 L	1000	**1200 M**	**1400 H**	**1600**	**1700**	**1850**	2000	2200	2300	2400
048	0.50	650	800	900	1050 L	1150	**1250**	**1350 M**	**1450**	**1550 H**			
048 w/1hp*	0.75	800	900	1000 L	1200	**1400 M**	**1600 H**	**1700**	**1850**	2000	2200	2300	2400
060	0.75	800	950	1100 L	1300	**1500 M**	**1750**	**1950 H**	**2100**	**2300**			
070	0.75	800	950	1100 L	1300	**1500**	**1750 M**	**1950**	**2100 H**	**2300**			

Dual Capacity

MODEL	MAX ESP	AIR FLOW DIP SWITCH SETTINGS											
		1	2	3	4	5	6	7	8	9	10	11	12
026	0.50		400	500 L	600	**700 M**	**800**	**900 H**	**1000**	1100	1200		
038	0.50	650	750 L	850	1000	**1100 M**	**1200**	**1300 H**	**1400**	**1500**			
038 w/1hp*	0.75	800 L	1000	**1100 M**	**1300 H**	**1500**	**1600**	1800					
049	0.50	650	800 L	900	1050	1150	**1250**	**1350 M**	**1450**	**1550 H**			
049 w/1hp*	0.75	800 L	900	1000	1200	**1400 M**	**1600 H**	**1700**	**1850**	2000	2200	2300	2400
064	0.75	800	950 L	1100	1300	**1500 M**	**1750**	**1950 H**	**2100**	**2300**			
072	0.75	800	950	1100 L	1300	**1500**	**1750 M**	**1950**	**2100 H**	**2300**			

Factory settings are at recommended L-M-H DIP switch locations
M-H settings MUST be located within boldface CFM range
Lowest and Highest DIP switch settings are assumed to be L and H respectively

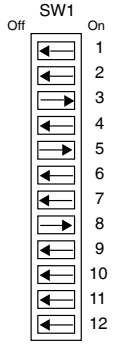
CFM is controlled within ±5% up to the maximum ESP
Max ESP includes allowance for wet coil and standard filter

A 12-position DIP switch package on the control allows the airflow levels to be set for low, medium, and high speed when using the ECM2 blower motor. Only three of the DIP switches can be in the "on" position.

- The first "on" switch (the lowest position number) determines the low speed fan setting.
- The second "on" switch determines the medium speed fan setting.
- The third "on" switch determines the high speed fan setting.

The example to the right shows SW1 on the control board configured for the following N040 airflow settings.

Low Speed Fan: 900 CFM
Medium Speed Fan: 1150 CFM
High Speed Fan: 1450 CFM



Fan Performance Data

Standard PSC Motor

Model	Fan Spd	Blower Size	Motor HP	Airflow (cfm) at External Static Pressure (in. wg)															
				0	**0.05**	**0.10**	**0.15**	**0.20**	**0.25**	**0.30**	**0.35**	**0.40**	**0.45**	**0.50**	**0.60**	**0.70**	**0.80**	**0.90**	**1.00**
NS009	H	6 x 8	1/10	480	450	440	420	410	380	360	340	330	310	300	-	-	-	-	-
	MH			440	410	400	380	370	350	330	310	300	280	270	-	-	-	-	-
	ML*			395	370	360	340	330	310	290	280	270	250	240	-	-	-	-	-
	L			325	310	300	280	270	250	240	230	220	210	200	-	-	-	-	-
NS012	**H**	6 x 8	1/10	480	450	440	420	410	380	360	340	330	310	300	-	-	-	-	-
	MH*			440	410	400	380	370	350	330	310	300	280	270	-	-	-	-	-
	ML			395	370	360	340	330	310	290	280	270	250	240	-	-	-	-	-
	L			325	310	300	280	270	250	240	230	220	210	200	-	-	-	-	-
NS015	H	9 x 7	1/6	845	835	825	815	800	790	775	755	735	710	680	565	-	-	-	-
	M			735	730	725	715	705	700	690	675	660	630	600	485	-	-	-	-
	L			620	615	610	605	600	590	580	565	550	520	490	-	-	-	-	-
NS018	H	9 x 7	1/6	845	835	825	815	800	790	775	755	735	710	680	565	-	-	-	-
	M			735	730	725	715	705	700	690	675	660	630	600	485	-	-	-	-
	L			620	615	610	605	600	590	580	565	550	520	490	-	-	-	-	-
NS022	H	9 x 7	1/5	1110	1095	1080	1065	1045	1020	995	970	945	915	880	810	-	-	-	-
	M			850	845	835	825	815	805	795	775	755	735	715	-	-	-	-	-
	L			750	745	740	735	725	715	700	685	670	650	630	-	-	-	-	-
NS030	H	9 x 7	1/3	1290	1270	1245	1220	1190	1160	1125	1090	1055	1020	985	880	760	-	-	-
	M			1100	1090	1075	1060	1045	1020	995	970	940	910	875	785	625	-	-	-
	L			910	905	900	895	885	875	865	850	835	810	780	710	560	-	-	-
NS036	H	10 x 10	1/2	1665	1640	1610	1580	1550	1515	1480	1450	1415	1315	1215	1090	980	-	-	-
	M			1465	1445	1425	1400	1375	1350	1325	1260	1190	1140	1090	990	890	-	-	-
	L			1130	1115	1100	1090	1075	1035	995	965	930	895	860	795	730	-	-	-
NS042	H	10 x 10	1/2	2010	1975	1940	1905	1870	1825	1780	1735	1690	1640	1590	1470	1210	-	-	-
	M			1670	1650	1630	1610	1590	1560	1530	1495	1460	1425	1390	1190	1080	-	-	-
	L			1220	1215	1210	1295	1200	1180	1160	1130	1100	1060	1020	930	-	-	-	-
NS048	H	10 x 10	1/2	2010	1975	1940	1905	1870	1825	1780	1735	1690	1640	1590	1470	1210	-	-	-
	M			1670	1650	1630	1610	1590	1560	1530	1495	1460	1425	1390	1190	1080	-	-	-
	L			1220	1215	1210	1295	1200	1180	1160	1130	1100	1060	1020	930	-	-	-	-
NS060	H	11 x 10	1	2430	2400	2365	2330	2290	2255	2215	2180	2140	2095	2045	1945	1835	1715	1510	1330
	M			2265	2235	2205	2175	2145	2110	2070	2035	2000	1960	1915	1825	1730	1605	1440	1260
	L			2075	2050	2020	1995	1965	1940	1915	1885	1850	1820	1785	1720	1610	1505	1335	1175
NS070	**H**	11 x 10	1	2430	2400	2365	2330	2290	2255	2215	2180	2140	2095	2045	1945	1835	1715	1510	1330
	M			2265	2235	2205	2175	2145	2110	2070	2035	2000	1960	1915	1825	1730	1605	1440	1260
	L			2075	2050	2020	1995	1965	1940	1915	1885	1850	1820	1785	1720	1610	1505	1335	1175

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Optional High Static PSC Motor

Model	Fan Spd	Blower Size	Motor HP	Airflow (cfm) at External Static Pressure (in. wg)															
				0	**0.05**	**0.10**	**0.15**	**0.20**	**0.25**	**0.30**	**0.35**	**0.40**	**0.45**	**0.50**	**0.60**	**0.70**	**0.80**	**0.90**	**1.00**
NS022	H	9 x 7	1/3	1290	1270	1245	1220	1190	1160	1125	1090	1055	1020	985	880	760	-	-	-
	M			1100	1090	1075	1060	1045	1020	995	970	940	910	875	785	625	-	-	-
	L			910	905	900	895	885	875	865	850	835	810	780	710	560	-	-	-
NS030	H	9 x 7	1/2	1365	1340	1325	1305	1280	1250	1215	1180	1140	1100	1055	960	850	-	-	-
	M			1040	1040	1035	1030	1020	1005	990	970	945	915	885	810	735	-	-	-
	L			880	880	880	880	875	870	860	840	820	800	775	730	480	-	-	-
NS036	H	10 x 10	1/2	1930	1905	1875	1840	1805	1765	1725	1680	1635	1530	1425	1270	1150	1025	-	-
	M			1635	1620	1600	1580	1555	1530	1505	1465	1425	1335	1240	1135	1035	775	-	-
	L			1230	1230	1225	1215	1200	1165	1130	1095	1060	1035	1005	935	795	675	-	-
NS042	H	10 x 10	3/4	2115	2075	2035	1980	1920	1900	1880	1840	1795	1730	1660	1390	1225	1070	-	-
	M			2005	1980	1950	1910	1865	1815	1765	1725	1685	1585	1485	1315	1140	1025	-	-
	L			1860	1835	1805	1780	1750	1715	1675	1635	1590	1540	1490	1260	1115	980	-	-
NS048	H	10 x 10	3/4	2115	2075	2035	1980	1920	1900	1880	1840	1795	1730	1660	1390	1225	1070	-	-
	M			2005	1980	1950	1910	1865	1815	1765	1725	1685	1585	1485	1315	1140	1025	-	-
	L			1860	1835	1805	1780	1750	1715	1675	1635	1590	1540	1490	1260	1115	980	-	-

2/15/08

Factory settings are in Bold.

High-Static option not available for NS060 and NS070.

Air flow values are with dry coil and standard filter.

For wet coil performance first calculate the face velocity of the air coil (Face Velocity [fpm] = Airflow [cfm] / Face Area [sq ft]).

Then for velocities of 200 fpm reduce the static capability by 0 03 in. wg, 300 fpm by 0.08 in. wg, 400 fpm by 0.12in. wg. and 500 fpm by 0.16 in. wg.

* Setting for 265 V operation.

Reference Calculations

Heating Calculations:	Cooling Calculations:
$LWT = EWT - \frac{HE}{GPM \times 500}$	$LWT = EWT + \frac{HR}{GPM \times 500}$
$LAT = EAT + \frac{HC}{CFM \times 1.08}$	$LAT\ (DB) = EAT\ (DB) - \frac{SC}{CFM \times 1.08}$
$TH = HC + HW$	$LC = TC - SC$
	$S/T = \frac{SC}{TC}$

Legends and Notes

ABBREVIATIONS AND DEFINITIONS:

CFM = airflow, cubic feet/minute
EWT = entering water temperature, Fahrenheit
GPM = water flow in gallons/minute
WPD = water pressure drop, PSI and feet of water
EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)
HC = air heating capacity, MBTUH
TC = total cooling capacity, MBTUH
SC = sensible cooling capacity, MBTUH
KW = total power unit input, kilowatts
HR = total heat of rejection, MBTUH
HE = total heat of extraction, MBTUH
HW = desuperheater capacity, MBTUH
EER = Energy Efficient Ratio
= BTU output/Watt input
COP = Coefficient of Performance
= BTU output/BTU input
LWT = leaving water temperature, °F
LAT = leaving air temperature, °F
TH = total heating capacity, MBTUH
LC = latent cooling capacity, MBTUH
S/T = sensible to total cooling ratio

Notes (Refer to Capacity Data tables)

- Capacity ratings are based on 80°F DB / 67°F WB EAT for cooling and 70°F DB EAT for heating.
- Three flow rates are shown for each unit. The lowest flow rate shown is used for geothermal open loop/well water systems with a minimum of 50°F EWT. The middle flow rate shown is the minimum geothermal closed loop flow rate. The highest flow rate shown is optimum for geothermal closed loop systems and the suggested flow rate for boiler/tower applications.
- The desuperheater numbers are based on a flow rate of 0.4 GPM/ton of rated capacity with an EWT of 90°F.
- Entering water temperatures below 40°F assumes 15% antifreeze solution.
- For non-standard EAT conditions, apply the appropriate correction factors on (Refer to Correction Factor Tables).
- Interpolation between EWT, GPM and CFM data is permissible.

Correction Factor Tables

Part Load Air Flow Corrections

Airflow		Cooling				Heating		
CFM Per Ton of Clg	% of Nominal	Total Cap	Sens Cap	Power	Heat of Rej	Htg Cap	Power	Heat of Ext
240	60	0.922	0.778	0.956	0.924	0.943	1.239	0.879
275	69	0.944	0.830	0.962	0.944	0.958	1.161	0.914
300	75	0.957	0.866	0.968	0.958	0.968	1.115	0.937
325	81	0.970	0.900	0.974	0.970	0.977	1.075	0.956
350	88	0.982	0.933	0.981	0.980	0.985	1.042	0.972
375	94	0.991	0.968	0.991	0.991	0.993	1.018	0.988
400	**100**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**
425	106	1.007	1.033	1.011	1.008	1.007	0.990	1.010
450	113	1.013	1.065	1.023	1.015	1.012	0.987	1.018
475	119	1.017	1.099	1.037	1.022	1.018	0.984	1.025
500	125	1.020	1.132	1.052	1.027	1.022	0.982	1.031
520	130	1.022	1.159	1.064	1.030	1.025	0.979	1.034

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Full Load Air Flow Corrections

Airflow		Cooling				Heating		
CFM Per Ton of Clg	% of Nominal	Total Cap	Sens Cap	Power	Heat of Rej	Htg Cap	Power	Heat of Ext
240	60	0.922	0.786	0.910	0.920	0.943	1.150	0.893
275	69	0.944	0.827	0.924	0.940	0.958	1.105	0.922
300	75	0.959	0.860	0.937	0.955	0.968	1.078	0.942
325	81	0.971	0.894	0.950	0.967	0.977	1.053	0.959
350	88	0.982	0.929	0.964	0.978	0.985	1.031	0.973
375	94	0.992	0.965	0.982	0.990	0.993	1.014	0.988
400	**100**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**
425	106	1.007	1.034	1.020	1.010	1.007	0.990	1.011
450	113	1.012	1.065	1.042	1.018	1.013	0.983	1.020
475	119	1.017	1.093	1.066	1.026	1.018	0.980	1.028
500	125	1.019	1.117	1.092	1.033	1.023	0.978	1.034
520	130	1.020	1.132	1.113	1.038	1.026	0.975	1.038

5/30/06

Cooling Capacity Corrections (Dual Capacity Full & Part Load; Single Speed)

Entering Air WB ºF	Total Clg Cap	Sensible Cooling Capacity Multipliers - Entering DB ºF										Power Input	Heat of Rejection
		60	65	70	75	**80**	80.6	85	90	95	100		
45	0.719	0.891	1.058	1.128	*	*	*	*	*	*	*	0.898	0.741
50	0.719	0.893	0 980	1.106	*	*	*	*	*	*	*	0.898	0.741
55	0.812	0.629	0.844	1.026	1.172	*	*	*	*	*	*	0.922	0.819
60	0.897			0.820	0.995	1.206	1 238	*	*	*	*	0.955	0.895
65	0.960			0.568	0.810	1.004	1.052	1.227	*	*	*	0.982	0.951
66.2	0.984			0.505	0.743	1.002	1.027	1.151	*	*	*	0.993	0.980
67	**1.000**			0.463	0.699	**1.000**	1.011	1.101	1.310	*	*	**1.000**	**1.000**
70	1.047				0.599	0.865	0.879	1.007	1.225	1.433	*	1.018	1.029
75	1.148					0.567	0.584	0.734	0.956	1.261	1.476	1.056	1.118

Note: * Sensible capacity equals total capacity at conditions shown.

7/20/06

Heating Capacity Corrections (Dual Capacity Full & Part Load; Single Speed)

	Heating Corrections		
Ent Air DB °F	Htg Cap	Power	Heat of Ext
45	1.050	0.749	1.158
50	1.059	0.859	1.130
55	1.043	0.894	1.096
60	1.033	0.947	1.064
65	1.023	0.974	1.030
68	1.009	0.990	1.012
70	**1.000**	**1.000**	**1.000**
75	1.011	1.123	0.970
80	1.000	1.196	0.930

7/20/06

NS009 - Single Speed - PSC

Capacity Data (350 CFM)

EWT	Flow Rate	Water Pressure Drop		HEATING - EAT 70 °F					COOLING - EAT 80/67 °F					
				HC	Power	HE	LAT		TC	SC	S/T	Power	HR	
°F	GPM	PSI	FT/HD	kBtuh	kW	kBtuh	°F	COP	kBtuh	kBtuh	Ratio	kW	kBtuh	EER
20	1 5	2.0	4.5	Operation not recommended					Operation not recommended					
	2 0	3.6	8.3											
	3.0	7.0	16.2	6.4	0.65	4.2	84.9	2.86						
30	1.5	1.9	4.4	Operation not recommended					Operation not recommended					
	2.0	3.5	8.1	7.4	0.68	5.1	87.5	3.19	12.0	7.8	0.65	0.38	13.3	31.6
	3.0	6.9	15.9	7.3	0.68	5.0	87.3	3.16	11.6	7.5	0.65	0.38	12.9	30.3
40	1.5	1.9	4.3	Operation not recommended					Operation not recommended					
	2.0	3.4	7.9	8.2	0.69	5.9	89.8	3.47	11.7	7.7	0.66	0.42	13.2	27.8
	3.0	6.7	15.5	8.4	0.70	6.1	90.3	3.55	11.6	7.6	0.65	0.41	13.0	28.6
50	1.5	1.8	4.2	9.0	0.71	6.5	91.7	3.69	11.4	7.6	0.67	0.48	13.0	23.7
	2.0	3.4	7.8	9.2	0.71	6.7	92.3	3.77	11.5	7.6	0.67	0.46	13.0	24.8
	3.0	6.5	15.0	9.6	0.72	7.1	93.4	3.91	11.6	7.7	0.66	0.43	13.1	27.2
60	1.5	1.8	4.0	10.1	0.73	7.6	94.6	4.04	10.9	7.4	0.68	0.55	12.7	19.9
	2.0	3.3	7.6	10.3	0.73	7.8	95.3	4.12	10.9	7.4	0.68	0.53	12.7	20.7
	3.0	6.4	14.8	10.8	0.74	8.2	96.5	4.27	11.1	7.4	0.67	0.50	12.7	22.3
70	1.5	1.7	3.9	11 2	0.75	8.6	97.6	4.37	10.4	7.1	0.69	0.61	12.4	17.0
	2.0	3.2	7.5	11.4	0.75	8.9	98.3	4.45	10.4	7.1	0.69	0.60	12.4	17.5
	3.0	6.3	14.6	11 9	0.76	9.3	99.6	4.60	10 5	7.1	0.68	0.56	12.4	18.6
80	1.5	1.7	3.8	12.5	0.77	9.9	101.1	4.77	9.9	6.9	0.70	0.69	12.2	14.3
	2.0	3.2	7.3	12.8	0.77	10.2	101.9	4.85	9.9	6.9	0.70	0.68	12.2	14.6
	3.0	6.2	14.2	13.2	0.78	10.6	103.0	4.97	9.8	6.9	0.70	0.63	12.0	15.6
90	1.5	1.6	3.7	14.0	0.79	11.3	105.0	5.19	9.4	6.7	0.71	0.78	12.1	12.1
	2.0	3.1	7.2	14.3	0.80	11.6	105.8	5.27	9.4	6.7	0.71	0.77	12.1	12.3
	3.0	6.0	13.9	14.5	0.80	11.8	106.4	5.31	9.2	6.7	0.73	0.70	11.6	13.2
100	1.5	1.6	3.6	Operation not recommended					Operation not recommended					
	2.0	3.0	7.0						9.0	6.5	0.72	0.87	12.0	10.3
	3.0	5.9	13.6						8.6	6.5	0.75	0.80	11.4	10.8
110	1.5	1.5	3.5						Operation not recommended					
	2.0	3.0	6.9						8.6	6.2	0.73	0.99	11.9	8.7
	3.0	5.7	13.2						8.0	6.3	0.78	0.90	11.1	8 9
120	1.5	1.5	3.4						Operation not recommended					
	2.0	2.9	6.8						8.2	6.0	0.74	1.12	12.0	7 3
	3.0	5.6	12.9						7.5	6.0	0.80	1.02	10.9	7 3

NS012 - Single Speed - PSC

Capacity Data (400 CFM)

EWT	Flow Rate	Water Pressure Drop		HEATING - EAT 70 °F					COOLING - EAT 80/67 °F					
				HC	Power	HE	LAT		TC	SC	S/T	Power	HR	
°F	GPM	PSI	FT/HD	kBtuh	kW	kBtuh	°F	COP	kBtuh	kBtuh	Ratio	kW	kBtuh	EER
20	1 5	0.3	0.7	Operation not recommended					Operation not recommended					
	2.5	1.0	2.3											
	3.5	1.7	3.9	7.5	0.78	4.8	85.3	2.80						
30	1.5	0.3	0.7	Operation not recommended					Operation not recommended					
	2.5	1.0	2.3	9.0	0.80	6.3	88.8	3.29	16.3	10 3	0.63	0.43	17.8	37.7
	3.5	1.7	3.9	9.1	0.81	6.3	89.1	3.29	16.5	10 3	0.62	0.41	18.0	40.2
40	1.5	0.3	0.7	Operation not recommended					Operation not recommended					
	2.5	1.0	2.3	10.0	0.82	7.2	91.1	3.57	15.8	10.1	0.64	0.49	17.4	31.9
	3.5	1.7	3.9	10.3	0.83	7.4	91.7	3.64	16.0	10.1	0.63	0.46	17.6	34.9
50	1.5	0.3	0.7	10.6	0.83	7.8	92.5	3.75	15.0	10.0	0.66	0.61	17.1	24.6
	2.5	1.0	2.3	11 0	0.83	8.2	93.5	3.86	15.2	9.9	0.65	0.56	17.1	27.3
	3.5	1.7	3.8	11.4	0.84	8.5	94.4	3.97	15.5	9.9	0.64	0.51	17.2	30.6
60	1.5	0.3	0.7	11 8	0.85	8.9	95.2	4.08	14.5	9.7	0.67	0.69	16.9	21.1
	2.5	1.0	2.3	12.2	0.85	9.3	96.3	4.21	14.7	9.7	0.66	0.64	16.9	23.1
	3.5	1.7	3.8	12.7	0.86	9.8	97.4	4.33	14 9	9.7	0.65	0.59	16.9	25.3
70	1.5	0.3	0.7	12.9	0.86	10.0	98.0	4.40	14.1	9.4	0.67	0.77	16.7	18.3
	2.5	1.0	2.3	13.5	0.87	10.5	99.2	4.54	14 2	9.5	0.67	0.72	16.7	19.8
	3.5	1.7	3.8	14.0	0.88	11.0	100.4	4.67	14.4	9.6	0.67	0.67	16.7	21.4
80	1.5	0.3	0.7	14.3	0.88	11.3	101.2	4.76	13.6	9.2	0.68	0.87	16.6	15.7
	2.5	1.0	2.2	14.9	0.89	11.9	102.6	4 92	13.8	9.3	0.68	0.82	16.6	16.8
	3.5	1.6	3.8	15.3	0.90	12.2	103.4	5 00	13.9	9.4	0.68	0.76	16.5	18.2
90	1.5	0.3	0.7	15.8	0.90	12.8	104.7	5.15	13.2	9.0	0.68	0.97	16.5	13.6
	2.5	1.0	2.2	16.5	0.91	13.4	106.3	5.34	13.3	9.2	0.69	0.93	16.5	14.2
	3.5	1.6	3.8	16.6	0.92	13.5	106.4	5.32	13.4	9.2	0.69	0.85	16.3	15.7
100	1.5	0.3	0.7	Operation not recommended					Operation not recommended					
	2.5	1.0	2.2						12.9	9.0	0.70	1.06	16.5	12.1
	3.5	1.6	3.7						13.0	9.1	0.70	0.95	16.2	13.7
110	1.5	0.3	0.7						Operation not recommended					
	2.5	1.0	2.2						12.4	8.8	0.71	1.21	16.5	10.3
	3.5	1.6	3.6						12.6	8.9	0.71	1.05	16.2	12.0
120	1.5	0.3	0.7						Operation not recommended					
	2.5	1.0	2.2						12.0	8.6	0.72	1.37	16.7	8.8
	3.5	1.5	3.5						12.1	8.7	0.72	1.16	16.0	10.5

NS015 - Single Speed - PSC

Capacity Data (500 CFM)

EWT	Flow Rate	Water Pressure Drop		HEATING - EAT 70 °F					COOLING - EAT 80/67 °F					
				HC	Power	HE	LAT		TC	SC	S/T	Power	HR	
°F	GPM	PSI	FT/HD	kBtuh	kW	kBtuh	°F	COP	kBtuh	kBtuh	Ratio	kW	kBtuh	EER
20	2.0	0.6	1.4	Operation not recommended					Operation not recommended					
	3.0	1.6	3.7											
	4.0	2.7	6.1	10.5	0.95	7.2	87.4	3.22						
30	2.0	0.6	1.4	Operation not recommended					Operation not recommended					
	3.0	1.6	3.7	11.3	0.99	7.9	88.8	3.32	16.2	10.5	0.65	0.52	18.0	31.1
	4.0	2.6	6.1	11.4	0.99	8.0	89.1	3.37	15.3	10.0	0.65	0.52	17.1	29.7
40	2.0	0.6	1.4	Operation not recommended					Operation not recommended					
	3.0	1.6	3.7	12.4	1.01	9.0	91.0	3.59	16.7	10.9	0.66	0.59	18.7	28.2
	4.0	2.6	6.0	12.7	1.01	9.3	91.6	3.68	16.4	10.7	0.66	0.57	18.3	28.7
50	2.0	0.6	1.4	13.3	1.04	9.7	92.6	3.76	16.9	11.3	0.67	0.70	19.3	24.2
	3.0	1.6	3.7	13.7	1 04	10.1	93.3	3.87	17.1	11.4	0.66	0.66	19.4	25.9
	4.0	2.6	6.0	14.1	1 04	10.5	94.1	3.98	17.4	11.5	0.66	0.62	19 5	27.8
60	2.0	0.6	1.4	14.7	1 05	11.1	95.2	4.09	16.1	10.9	0.68	0.79	18 8	20.3
	3.0	1.6	3.7	15.2	1.06	11.5	96.1	4.20	16.3	11.0	0.67	0.75	18 9	21.6
	4.0	2.6	6.0	15.6	1.06	12.0	96.9	4.31	16.5	11.1	0.67	0.72	19.0	23.1
70	2.0	0.6	1.4	16.1	1.07	12.4	97.8	4.40	15.2	10.5	0.69	0 89	18.3	17.2
	3.0	1.6	3.7	16.6	1.08	13.0	98.8	4.51	15.4	10.6	0.69	0.85	18.3	18.2
	4.0	2.6	6 0	17.2	1.09	13.5	99.8	4.62	15.7	10.6	0.68	0.81	18.4	19.4
80	2.0	0.6	1.4	17.7	1.09	14.0	100 8	4.76	14.5	10.2	0.70	1.00	17.9	14.4
	3.0	1.6	3.7	18.4	1.11	14.6	102 0	4.88	14.7	10.2	0.70	0.96	17.9	15.3
	4.0	2.6	5 9	18.8	1.11	15.0	102 8	4.96	14.9	10.4	0.70	0.91	18.0	16.4
90	2.0	0.6	1.4	19.5	1.11	15.7	104 2	5.15	13.7	9.9	0.72	1.13	17.6	12.2
	3.0	1.6	3.6	20.3	1.13	16.4	105.6	5.26	13.9	9.8	0.71	1.09	17.6	12.8
	4.0	2.6	5 9	20.4	1.13	16.5	105.7	5.28	14.2	10.1	0.71	1.02	17.6	13.9
100	2.0	0.6	1.4	Operation not recommended					Operation not recommended					
	3.0	1.6	3.6						13.2	9 5	0.72	1.23	17.4	10.7
	4.0	2.5	5.9						13.3	9 8	0.74	1.13	17.1	11.7
110	2.0	0.6	1.4						Operation not recommended					
	3.0	1.6	3.6						12.5	9 2	0.73	1.39	17.3	9.0
	4.0	2.5	5.9						12.4	9 5	0.76	1.25	16.7	9.9
120	2.0	0.6	1.4						Operation not recommended					
	3.0	1.6	3.6						11.9	8.8	0.74	1.58	17.3	7.6
	4.0	2.5	5.8						11.2	9.2	0 82	1.38	15.9	8.1

NS018 - Single Speed - PSC

Capacity Data (600 CFM)

	Flow	Water		HEATING - EAT 70 °F						COOLING - EAT 80/67 °F						
EWT	Rate	Pressure Drop		HC	Power	HE	LAT		HWC	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	kBtuh	kW	kBtuh	°F	COP	kBtuh	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20	3.0	1 6	3 8	Operation not recommended						Operation not recommended						
	4.0	2 9	6 8													
	5.0	4 3	9 9	12.7	1.18	8.7	87.6	3.16	1.4							
30	3.0	1.6	3.7	Operation not recommended						Operation not recommended						
	4.0	2.9	6.7	14.4	1.25	10.1	90.2	3 36	1 5	19.5	12.9	0 66	0.76	22.1	25.8	--
	5.0	4.2	9.7	14.6	1.26	10.3	90.5	3.40	1 5	18.8	12.4	0 66	0.74	21.4	25.4	--
40	3.0	1.6	3 6	Operation not recommended						Operation not recommended						
	4.0	2.9	6 6	15.9	1.31	11.4	92.5	3 55	1 6	19.9	13.0	0 65	0 81	22.7	24.7	--
	5.0	4.2	9 6	16.3	1.32	11.8	93.1	3 61	1 6	19.8	12.7	0 64	0.75	22.3	26.2	--
50	3.0	1.6	3.6	17.1	1.36	12.4	94.3	3 69	1.7	20.1	13.2	0 65	0 95	23.3	21.3	0 9
	4.0	2.9	6.6	17.5	1.37	12.8	95.0	3.75	1.7	20.4	13.1	0 64	0 86	23.3	23.8	0 9
	5.0	4.2	9.6	17.9	1.38	13.2	95.7	3 81	1 8	20.7	13.1	0 63	0.77	23.3	27.0	0 9
60	3.0	1.5	3.5	19.0	1.42	14.2	97.4	3 94	1 9	19.2	12.6	0 66	1 00	22.6	19.2	1.1
	4.0	2.8	6.5	19.4	1.43	14.5	98.0	3 98	1 9	19.4	12.6	0 65	0 94	22.6	20.6	1.1
	5.0	4.1	9.5	19.8	1.45	14.9	98.6	4 02	2 0	19.6	12.6	0 64	0 88	22.6	22.3	1 0
70	3.0	1.5	3.5	21.0	1.48	16.0	100.4	4.17	2.1	18.3	12.1	0 66	1 05	21.9	17.4	1.3
	4.0	2.8	6 5	21.4	1.50	16.3	101 0	4.18	2.1	18.4	12.1	0 66	1 02	21.9	18.0	1.3
	5.0	4.1	9 5	21.7	1.52	16.6	101 6	4 20	2 2	18.5	12.1	0 66	0 99	21.9	18.6	1.2
80	3.0	1.5	3.4	23.3	1.54	18.1	104 0	4.44	2.4	17.5	11.6	0 66	1.11	21.3	15.8	1.7
	4.0	2.8	6.4	23.7	1.57	18.3	104 5	4.43	2.4	17.5	11.6	0 67	1.12	21.3	15.6	1.6
	5.0	4.1	9.4	24.0	1.58	18.6	105.1	4.45	2 5	17.7	11.8	0 67	1.12	21.5	15.8	1.5
90	3.0	1 5	3.4	25.9	1.61	20.4	108 0	4.72	2 8	16.7	11.1	0 66	1.17	20.7	14.3	2.2
	4.0	2 8	6.4	26.1	1.64	20.5	108 3	4 68	2 8	16.6	11.2	0 67	1 22	20.8	13.6	2.0
	5 0	4 0	9 2	26.3	1.65	20.7	108 6	4 67	2 8	16.8	11.4	0 68	1 24	21.1	13.6	1.9
100	3 0	1.4	3 3	Operation not recommended						Operation not recommended						
	4 0	2.7	6 3							15.8	10.7	0 68	1 34	20.4	11 8	2.5
	5 0	4 0	9.1							15.8	11.0	0.70	1 37	20.4	11 5	2.3
110	3 0	1.4	3 2							Operation not recommended						
	4 0	2.7	6 2							15.0	10.3	0 69	1.46	20.0	10.3	3.2
	5.0	3 9	9 0							14.7	10.7	0.73	1 50	19.8	9.8	3.0
120	3.0	1.4	3 2							Operation not recommended						
	4.0	2.7	6 2							14.3	9 9	0.70	1 60	19.7	8.9	4.0
	5 0	3 9	8 9							13.7	10.2	0.75	1 66	19.4	8.3	3.6

NS022 - Single Speed - PSC

Capacity Data (700 CFM)

EWT	Flow Rate	Water Pressure Drop		HEAT NG - EAT 70 °F						COOL NG - EAT 80/67 °F						
				HC	Power	HE	LAT		HWC	TC	SC	S/T	Power	HR		HWC
ºF	GPM	PSI	FT/HD	kBtuh	kW	kBtuh	ºF	COP	kBtuh	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20	3 0	0 9	2.2	Operation not recommended						Operation not recommended						
	4 5	1 8	4.2													
	6 0	2 9	6.8	12 9	1.32	8.4	87.1	2 87	1 5							
30	3 0	0 9	2.1	Operation not recommended						Operation not recommended						
	4 5	1.7	4.0	15 2	1.33	10.7	90.1	3 35	1 6	23.4	17.4	0.75	0.83	26.2	28.3	---
	6 0	2.8	6.6	15.4	1.34	10.8	90.4	3 36	1 6	23.7	17.4	0.74	0.80	26.4	29.5	---
40	3 0	0.9	2.0	Operation not recommended						Operation not recommended						
	4 5	1.7	3.9	17 8	1.36	13.2	93.6	3 86	1 8	24.2	17.4	0.72	0.89	27.2	27.3	---
	6 0	2.8	6.4	18.1	1.37	13.5	94.0	3 89	1 8	24.5	17.4	0.71	0.86	27.4	28.4	---
50	3 0	0.9	2.0	19.4	1.36	14.7	95.6	4.18	2.0	24.7	17.1	0.69	1.01	28.2	24.4	1 2
	4.5	1.6	3.8	20 3	1.38	15.6	96.8	4.29	2.0	25.0	17 3	0.69	0.97	28.3	25.8	1.1
	6.0	2.7	6.2	20.7	1.39	15.9	97.3	4.35	2.1	25 2	17 3	0.68	0.94	28.4	26.7	1.1
60	3.0	0.8	1.9	21 8	1.39	17.1	98.9	4.60	2.2	23 9	16 9	0.71	1.11	27.7	21.4	1.4
	4.5	1.6	3.7	22 9	1.42	18.0	100 3	4.72	2.3	24.1	17.1	0.71	1.06	27.8	22.7	1.3
	6.0	2.6	6.0	23.3	1.43	18.4	100 8	4.77	2.3	24.4	17.1	0.70	1 04	27.9	23.5	1.3
70	3.0	0.8	1.8	24.3	1.43	19.4	102 2	4.99	2.5	23 6	16.7	0.71	1 25	27.8	18.9	1.7
	4.5	1.5	3.6	25.5	1.46	20.5	103 8	5.11	2.5	23 8	16 9	0.71	1.19	27.9	20.1	1.7
	6.0	2.5	5.8	25.9	1.47	20.9	104 3	5.15	2.6	24 0	16 9	0.70	1.15	28.0	20.8	1.6
80	3.0	0.8	1.8	26.6	1.48	21.5	105.1	5.27	2.8	22 6	16.4	0.73	1 39	27.3	16.2	2.2
	4.5	1.5	3.4	27.8	1 51	22.7	106.8	5.41	2.8	22 8	16.6	0.73	1 32	27.3	17.3	2.1
	6.0	2.4	5.6	28.3	1 52	23.1	107.4	5.45	2.9	23 0	16.6	0.72	1 29	27.4	17.9	2.0
90	3.0	0.7	1.7	28.8	1 53	23.6	108.1	5.53	3.1	20 9	15.9	0.76	1 55	26.2	13.5	2.7
	4.5	1.4	3.3	30.1	1 55	24.8	109.8	5.67	3.2	21.1	16.1	0.77	1.47	26.1	14.3	2.6
	6.0	2.3	5.4	30.7	1 57	25.3	110 5	5.71	3.3	21 3	16.1	0.76	1.44	26.2	14.8	2.4
100	3.0	0.7	1.7	Operation not recommended						Operation not recommended						
	4.5	1.4	3.2							20 2	15.7	0.78	1 66	25.8	12.2	3.2
	6.0	2.2	5.2							20 3	15.7	0.77	1 61	25.9	12.6	3.0
110	3.0	0.7	1.6							Operation not recommended						
	4.5	1.3	3.1							18 0	15.2	0 84	1 85	24.3	9.7	3.9
	6.0	2.2	5.0							18.2	15.2	0.83	1.80	24.3	10.1	3.7
120	3 0	0.7	1.5							Operation not recommended						
	4 5	1 3	2.9							16.7	14.6	0.88	2.08	23.8	8.0	4.7
	6 0	2.1	4.8							16.9	14.6	0.87	2.02	23.8	8.3	4.4

NS030 - Single Speed - PSC

Capacity Data (900 CFM)

EWT °F	Flow gpm	WPD		HEATING - EAT 70°F						COOLING - EAT 80/67 °F						
		PSI	FT	HC kBtuh	Power kW	HE kBtuh	LAT °F	COP	HWC kBtuh	TC kBtuh	SC kBtuh	S/T Ratio	Power kW	HR kBtuh	EER	HWC kBtuh
20	4.0	1.5	3.5	Operation not recommended						Operation not recommended						
	6.0	3.1	7.2													
	8.0	5.2	12.1	17.6	1.67	11.9	88.1	3.09	2.0							
30	4.0	1.5	3.4	Operation not recommended						Operation not recommended						
	6.0	3.0	7 0	20.2	1.66	14.6	90.8	3.57	2.2	26.4	18.9	0.71	1.06	30.0	24.9	---
	8.0	5.1	11.8	20.7	1.68	14.9	91.2	3.61	2.2	26.9	18.8	0.70	1.03	30.4	26.1	---
40	4.0	1.4	3 3	Operation not recommended						Operation not recommended						
	6.0	2.9	6 8	23.7	1.70	17.9	94.4	4.07	2.4	28.7	20.4	0.71	1.14	32.6	25.1	---
	8.0	4.9	11.4	24.2	1.72	18.3	94.9	4.12	2.5	29.1	20.3	0.70	1.11	32.9	26.1	---
50	4.0	1.4	3 2	25.9	1.74	20.0	96.6	4.36	2.6	30.7	21.8	0.71	1.29	35.1	23.8	1.5
	6.0	2.8	6.6	26.8	1.75	20.8	97.6	4.49	2.7	30.8	21.9	0.71	1.25	35.0	24.7	1.4
	8 0	4.8	11.1	27.4	1.76	21.3	98.1	4.55	2.8	31.2	21.9	0.70	1.22	35.3	25.5	1.4
60	4 0	1.4	3.1	29.1	1.80	23.0	99.9	4.75	3.0	30.0	21.4	0.72	1.40	34.7	21.4	1.8
	6 0	2.8	6.4	30.1	1.81	23.9	101.0	4.89	3.0	30.0	21.5	0.71	1.35	34.7	22.2	1.7
	8 0	4.6	10.7	30.7	1.82	24.5	101.6	4.93	3.1	30.4	21.5	0.71	1.32	34.9	22.9	1.6
70	4 0	1.3	3 0	32.4	1.87	26.0	103.3	5.08	3.3	30.1	21.7	0.72	1.54	35.4	19.5	2.2
	6 0	2.7	6 2	33.5	1.88	27.1	104.5	5.22	3.4	30.2	21.7	0.72	1.49	35.3	20.3	2.1
	8 0	4.5	10.4	34.1	1.90	27.6	105.1	5.24	3.5	30.6	21.8	0.71	1.46	35.5	20.9	2.0
80	4 0	1.3	2.9	35.1	1.93	28.5	106.1	5.32	3.7	28.9	21.4	0.74	1.70	34.7	17.0	2.8
	6 0	2.6	5.9	36.4	1.95	29.7	107.4	5.46	3.8	29.0	21.4	0.74	1.64	34.6	17.7	2.7
	8 0	4.3	10.0	36.9	1.98	30.2	108.0	5.48	3.9	29.3	21.5	0.73	1.61	34.8	18.2	2.5
90	4 0	1.2	2.8	37.9	2.01	31.0	108.9	5.51	4.2	26.7	20.2	0.76	1.87	33.1	14.3	3.5
	6 0	2.5	5.7	39.3	2.04	32.3	110.4	5.64	4.3	26.9	20.2	0.75	1.80	33.0	14.9	3.3
	8 0	4.2	9.6	39.9	2.06	32.8	111 0	5.66	4.4	27.1	20.3	0.75	1.77	33.2	15.3	3.2
100	4 0	1.2	2.7	Operation not recommended						Operation not recommended						
	6 0	2.4	5.5							25.6	20.2	0.79	2.01	32.5	12.8	4.1
	8 0	4.0	9.3							25.9	20.3	0.78	1.97	32.6	13.1	3.9
110	4 0	1.1	2.6							Operation not recommended						
	6.0	2.3	5.3							21.7	18.9	0.87	2.22	29.3	9.8	5.0
	8.0	3.9	8.9							22.0	19.0	0.87	2.17	29.4	10.1	4.7
120	4.0	1.1	2 5							Operation not recommended						
	6.0	2.2	5.1							21.0	18.3	0.87	2.47	29.5	8.5	6.0
	8.0	3.7	8.6							21.3	18.3	0.86	2.42	29.5	8.8	5.7

NS036 - Single Speed - PSC

Capacity Data (1250 CFM)

	Flow	Water		HEAT NG - EAT 70 °F						COOL NG - EAT 80/67 °F						
EWT	Rate	Pressure Drop		HC	Power	HE	LAT		HWC	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	kBtuh	kW	kBtuh	°F	COP	kBtuh	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20	5 0	1 0	2.4	Operation not recommended						Operation not recommended						
	7 0	2.1	4.9													
	9 0	3 6	8.2	21 8	1.99	15.0	86.1	3 21	2.4							
30	5 0	1 0	2.3	Operation not recommended						Operation not recommended						
	7 0	2.1	4.7	24 5	1.99	17.7	88.1	3 60	2 6	30.3	21.8	0.72	1.27	34.7	23.9	---
	9 0	3.5	8.0	25 0	2.01	18.1	88.5	3 64	2.7	30.8	21.7	0.70	1.23	35.0	25.1	---
40	5 0	1.0	2.3	Operation not recommended						Operation not recommended						
	7 0	2.0	4.6	28.4	2.04	21.5	91.1	4 09	3 0	33.3	24 2	0.73	1.37	38.0	24.3	---
	9 0	3.4	7.8	29 0	2.06	22.0	91.5	4.14	3 0	33.8	24.1	0.71	1.33	38.3	25.3	---
50	5 0	1.0	2.2	30 9	2.07	23.8	92.9	4 37	3.2	35.9	26 2	0.73	1.55	41.2	23.3	1.7
	7.0	1.9	4.5	32 0	2.08	24.9	93.7	4.51	3.3	36.0	26 3	0.73	1.49	41.1	24.1	1 6
	9.0	3.3	7.5	32 6	2.10	25.5	94.2	4.56	3.4	36 5	26 3	0.72	1.46	41.5	25.0	1 6
60	5.0	0.9	2.1	34.7	2.11	27.5	95.7	4.81	3.6	35.7	26 8	0.75	1.67	41.4	21.4	2.1
	7.0	1.9	4.3	35.9	2.12	28.6	96.6	4.95	3.7	35 8	26 8	0.75	1 61	41.2	22.2	2.0
	9.0	3.1	7.3	36.6	2.15	29.2	97.1	4.99	3.8	36 2	26 9	0.74	1 58	41.6	22.9	1.9
70	5.0	0.9	2.1	38.6	2.16	31.3	98.6	5.24	4.1	36 2	27 8	0.77	1 83	42.4	19.7	2.6
	7.0	1.8	4.2	40.0	2.18	32.6	99.6	5.38	4.2	36 3	27 8	0.77	1.77	42.3	20.5	2.5
	9.0	3.0	7.0	40.7	2 20	33.2	100.1	5.41	4.3	36.7	27 9	0.76	1.73	42.6	21.2	2.4
80	5.0	0.9	2.0	41.8	2 20	34.3	101.0	5.57	4.6	35 3	27.7	0.78	2 01	42.1	17.6	3.3
	7.0	1.7	4.0	43.4	2 23	35.8	102.1	5.71	4.7	35.4	27.7	0.78	1 93	42.0	18.3	3.1
	9.0	2.9	6.8	44.1	2 25	36.4	102.6	5.73	4.8	35 8	27.8	0.78	1 90	42.3	18.9	3.0
90	5.0	0.8	1.9	45.3	2 25	37.6	103.5	5.89	5.1	33.1	26.8	0 81	2.19	40.6	15.1	4.1
	7.0	1.7	3.9	47.0	2 28	39.2	104.8	6.03	5.3	33 3	26.8	0 81	2.11	40.5	15.8	3.9
	9.0	2.8	6.6	47.7	2 31	39.8	105.3	6.05	5.4	33 6	27.0	0 80	2 08	40.7	16.2	3.7
100	5.0	0.8	1.8	Operation not recommended						Operation not recommended						
	7.0	1.6	3.8							32 3	26.6	0 82	2 34	40.3	13.8	4.8
	9.0	2.7	6.3							32.7	26.7	0 82	2 29	40.5	14.2	4.6
110	5.0	0.8	1.8							Operation not recommended						
	7.0	1.6	3.6							29.1	24.7	0.85	2.57	37.8	11 3	5 9
	9 0	2 6	6.1							29.4	24.8	0.85	2.51	38.0	11.7	5 6
120	5 0	0.7	1.7							Operation not recommended						
	7 0	1 5	3.5							27.2	24.4	0.89	2.84	36.9	9.6	7.1
	9 0	2 5	5.8							27.6	24.4	0.89	2.78	37.0	9.9	6.7

NS042 - Single Speed - PSC

Capacity Data (1350 CFM)

EWT	Flow Rate	Water Pressure Drop		HEAT NG - EAT 70 °F						COOL NG - EAT 80/67 °F						
				HC	Power	HE	LAT		HWC	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	kBtuh	kW	kBtuh	°F	COP	kBtuh	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20	5 0	0 8	1.9	Operation not recommended						Operation not recommended						
	8 0	2 3	5.3													
	11.0	4.4	10.3	25.4	2.41	17.1	87.4	3 09	3.7							
30	5 0	0 8	1.8	Operation not recommended						Operation not recommended						
	8 0	2 2	5.1	29 3	2.45	21.0	90.1	3 51	3 9	41.0	28.4	0.69	1.76	47.0	23.3	---
	11.0	4.3	10.0	29.7	2.45	21.4	90.4	3 56	4 0	41.4	28.4	0.68	1.72	47.3	24.1	---
40	5 0	0.8	1.8	Operation not recommended						Operation not recommended						
	8 0	2.1	4.9	33 3	2.52	24.7	92.9	3 88	4 3	42.7	30 3	0.71	1.85	49.0	23.1	---
	11.0	4.2	9.7	33 9	2.52	25.3	93.3	3 94	4.4	43.1	30 3	0.70	1.80	49.3	23.9	---
50	5 0	0.7	1.7	35 8	2.52	27.2	94.6	4.16	4.7	43.3	31 3	0.72	2.05	50.3	21.1	2 6
	8.0	2.1	4.8	37 3	2.57	28.5	95.6	4.26	4.8	43.8	31 6	0.72	1.97	50.5	22.2	2 5
	11.0	4.1	9.4	38 0	2.58	29.3	96.1	4.33	5.0	44 2	31 6	0.71	1.92	50.8	23.0	2.4
60	5.0	0.7	1.7	39 3	2.57	30.5	97.0	4.48	5.3	43.1	32 0	0.74	2.22	50.6	19.4	3 2
	8.0	2.0	4.6	41.1	2.63	32.1	98.2	4.58	5.4	43 6	32.4	0.74	2.12	50.9	20.5	3.0
	11.0	3.9	9.1	42.0	2.65	33.0	98.8	4.66	5.6	44.1	32.4	0.73	2 07	51.1	21.3	2.9
70	5.0	0.7	1.6	42.7	2 63	33.7	99.3	4.76	6.0	43.1	33.1	0.77	2.41	51.4	17.9	4.0
	8.0	1.9	4.5	44.8	2.70	35.5	100.7	4.86	6.1	43 8	33.4	0.76	2 31	51.7	19.0	3.8
	11.0	3.8	8.8	45.9	2.73	36.6	101.5	4.94	6.3	44 3	33.4	0.75	2 25	51.9	19.7	3.6
80	5.0	0.7	1.6	45.9	2 65	36.9	101.5	5.09	6.7	41.4	32.3	0.78	2 64	50.4	15.6	5.1
	8.0	1.9	4.3	48.4	2.73	39.0	103.2	5.18	6.9	42.1	32.6	0.77	2 52	50.7	16.7	4.8
	11.0	3.7	8.5	49.8	2.77	40.3	104.1	5.28	7.1	42 6	32.6	0.77	2.46	50.9	17.3	4.6
90	5.0	0.7	1.5	49.1	2 68	40.0	103.7	5.37	7.5	39 0	31.4	0 80	2 91	48.9	13.4	6.4
	8.0	1.8	4.2	51.8	2.78	42.4	105.6	5.47	7.8	39 8	31.7	0 80	2.77	49.3	14.4	6.1
	11.0	3.5	8.2	53.5	2 82	43.9	106.7	5.57	8.0	40 2	31.7	0.79	2.70	49.4	14.9	5.8
100	5.0	0.6	1.5	Operation not recommended						Operation not recommended						
	8.0	1.7	4.0							38 2	31.1	0 81	3 04	48.6	12.6	7.5
	11.0	3.4	7.9							38 6	31.1	0 81	2 96	48.7	13.0	7.2
110	5.0	0.6	1.4							Operation not recommended						
	8.0	1.7	3.9							34.6	28.8	0.83	3.35	46.1	10.3	9 2
	11.0	3 3	7.6							35.0	28.8	0.82	3.26	46.1	10.7	8 8
120	5 0	0 6	1.3							Operation not recommended						
	8 0	1 6	3.7							32.5	28.4	0.88	3.68	45.1	8.8	11.1
	11.0	3 2	7.3							32.8	28.4	0.87	3.58	45.1	9.2	10.6

NS048 - Single Speed - PSC

Capacity Data (1500 CFM)

	Flow	Water		HEATING - EAT 70 °F						COOLING - EAT 80/67 °F						
EWT	Rate	Pressure Drop		HC	Power	HE	LAT		HWC	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	kBtuh	kW	kBtuh	°F	COP	kBtuh	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20	6.0	1.1	2 6	Operation not recommended						Operation not recommended						
	9.0	2.3	5.4													
	12.0	4.0	9 2	32.8	3.05	22.4	90.2	3.15	4 8							
30	6.0	1.1	2.5	Operation not recommended						Operation not recommended						
	9.0	2.3	5.3	37.5	3.13	26.8	93.1	3.51	5 2	49.7	34.1	0 69	1 94	56.3	25.6	---
	12.0	3.9	9.0	38.0	3.13	27.3	93.5	3.56	5 3	50.2	34.1	0 68	1 89	56.6	26.6	---
40	6.0	1.1	2.5	Operation not recommended						Operation not recommended						
	9.0	2.2	5.1	43.0	3.23	32.0	96.6	3.90	5.7	51.5	36.0	0.70	2.10	58.7	24.5	---
	12.0	3.8	8.7	43.8	3.24	32.7	97.0	3.96	5 8	52.1	36.0	0.69	2 05	59.0	25.5	---
50	6.0	1.0	2.4	46.2	3.26	35.1	98.5	4.16	6.2	52.5	37.4	0.71	2.40	60.7	21.9	3.1
	9.0	2.1	4.9	48.1	3.32	36.7	99.7	4.25	6.4	53.1	37.8	0.71	2.30	60.9	23.1	2 9
	12 0	3.7	8.4	49.0	3.33	37.7	100.3	4.31	6.5	53.6	37.8	0.70	2.24	61.3	23.9	2 8
60	6.0	1.0	2.3	50.8	3.33	39.5	101.4	4.48	7.0	51.1	37.0	0.72	2.63	60.1	19.4	3.7
	9.0	2.1	4.8	53.1	3.41	41.5	102.8	4.57	7.2	51.8	37.3	0.72	2.52	60.4	20.6	3 6
	12 0	3.5	8.2	54.4	3.43	42.7	103.6	4.64	7.4	52.3	37.3	0.71	2.45	60.7	21.4	3.4
70	6.0	1.0	2.2	55 5	3.41	43 9	104.3	4.78	7.9	50.8	37.4	0.74	2.91	60.7	17.4	4.7
	9.0	2.0	4.6	58 2	3.51	46 3	105.9	4.87	8.1	51.5	37.8	0.73	2.78	61.0	18.6	4 5
	12 0	3.4	7.9	59.7	3.54	47.7	106.9	4.95	8.3	52.1	37.8	0.73	2.70	61.3	19.3	4.2
80	6.0	0.9	2.1	59.4	3.46	47 5	106.6	5.03	8.8	48.5	36.6	0.75	3.23	59.5	15.0	5.9
	9.0	1.9	4.5	62 5	3.58	50 3	108.6	5.11	9.1	49.4	36.9	0.75	3.07	59.8	16.1	5.6
	12 0	3.3	7.6	64 3	3.62	51 9	109.7	5.20	9.4	49 9	36.9	0.74	2.99	60.1	16.7	5.4
90	6.0	0.9	2.1	63 2	3.52	51 2	109.0	5.26	9.9	45.1	34 9	0.77	3.57	57.3	12.6	7.4
	9.0	1.9	4.3	66 8	3.66	54 3	111 2	5.35	10 2	46 0	35 2	0.77	3.39	57.6	13.6	7.1
	12 0	3.2	7.4	68 9	3.71	56 2	112.5	5.44	10 6	46 5	35 2	0.76	3.30	57.7	14.1	6.7
100	6.0	0.9	2.0	Operation not recommended						Operation not recommended						
	9.0	1.8	4.2							44 3	34 8	0.78	3.76	57.1	11.8	8.8
	12.0	3.1	7.1							44 8	34 8	0.78	3.65	57 2	12.3	8.4
110	6.0	0.8	1.9							Operation not recommended						
	9.0	1.7	4.0							39 9	32 3	0 81	4.15	54.0	9.6	10.8
	12.0	3 0	6 8							40.3	32.3	0 80	4 03	54.0	10.0	10.2
120	6.0	0.8	1 8							Operation not recommended						
	9.0	1.7	3 8							37.6	31.7	0 84	4 59	53.3	8 2	13.0
	12.0	2.8	6.6							38.0	31.7	0 83	4.46	53.2	8 5	12.4

NS060 - Single Speed - PSC

Capacity Data (2000 CFM)

EWT	Flow Rate	Water Pressure Drop		HEATING - EAT 70 °F						COOLING - EAT 80/67 °F						
				HC	Power	HE	LAT		HWC	TC	SC	S/T	Power	HR		HWC
ºF	GPM	PSI	FT/HD	kBtuh	kW	kBtuh	ºF	COP	kBtuh	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20	9.0	2.5	5.7	Operation not recommended						Operation not recommended						
	12.0	4.0	9.2													
	15.0	5.9	13.5	39.6	4.02	25.9	88.3	2.89	5.8							
30	9.0	2.4	5.5	Operation not recommended						Operation not recommended						
	12.0	3.9	8.9	44.5	4.02	30.8	90.6	3.24	6.2	70.2	48.6	0.69	2.91	80.2	24.2	---
	15.0	5.7	13.1	45.9	4.12	31.8	91.2	3.26	6.4	71.4	48.1	0.67	2.74	80.8	26.1	---
40	9.0	2.3	5.3	Operation not recommended						Operation not recommended						
	12.0	3.7	8.7	52.5	4.19	38.2	94.3	3.67	6.9	71.7	49.8	0.69	3.10	82.3	23.1	---
	15.0	5.5	12.7	53.7	4.26	39.2	94.9	3.70	7.1	72.6	49.6	0.68	2.95	82.6	24.6	---
50	9.0	2.2	5.2	57.8	4.30	43.1	96.7	3.93	7.5	72.9	50.5	0.69	3.44	84.6	21.2	4.1
	12.0	3.6	8.4	59.2	4.34	44.4	97.4	4.00	7.7	72.9	51.0	0.70	3.38	84.4	21.6	3.9
	15.0	5.3	12.3	60.3	4.38	45.3	97.9	4.03	7.9	73.6	51.0	0.69	3.23	84.7	22.8	3.7
60	9.0	2.2	5.0	64.1	4.42	49.0	99.7	4.25	8.4	70.5	49.4	0.70	3.63	82.9	19.4	5.0
	12.0	3.5	8.1	65.5	4.47	50.3	100.3	4.30	8.7	70.8	49.6	0.70	3.53	82.9	20.1	4.8
	15.0	5.2	11.9	67.3	4.53	51.9	101.2	4.36	8.9	71.2	49.9	0.70	3.41	82.8	20.9	4.6
70	9.0	2.1	4.9	70.6	4.56	55.1	102.7	4.54	9.5	69.2	49.4	0.71	3.97	82.7	17.4	6.3
	12.0	3.4	7.9	71.9	4.60	56.2	103.3	4.58	9.8	69.9	49.4	0.71	3.83	83.0	18.2	6.0
	15.0	5.0	11.6	74.6	4.69	58.6	104.5	4.66	10.0	69.9	49.9	0.71	3.73	82.6	18.7	5.7
80	9.0	2.0	4.7	75.2	4.66	59.3	104.8	4.73	10.7	66.1	48.0	0.73	4.35	80.9	15.2	8.0
	12.0	3.3	7.6	77.8	4.68	61.8	106.0	4.87	11.0	66.8	48.0	0.72	4.16	81.0	16.0	7.6
	15.0	4.8	11.2	79.9	4.82	63.5	107.0	4.86	11.3	67.1	48.5	0.72	4.05	80.9	16.6	7.2
90	9.0	2.0	4.5	80.0	4.78	63.7	107.1	4.91	12.0	61.6	45.8	0.74	4.74	77.7	13.0	10.0
	12.0	3.2	7.3	83.9	4.78	67.6	108.8	5.14	12.4	62.2	45.8	0.74	4.49	77.5	13.8	9.5
	15.0	4.7	10.8	85.5	4.97	68.5	109.6	5.04	12.8	62.8	46.3	0.74	4.37	77.7	14.4	9.1
100	9.0	1.9	4.4	Operation not recommended						Operation not recommended						
	12.0	3.1	7.1							59.7	45.0	0.75	4.99	76.7	11.9	11.8
	15.0	4.5	10.4							60.3	45.5	0.76	4.87	76.9	12.4	11.2
110	9.0	1.8	4.2							Operation not recommended						
	12.0	2.9	6.8							54.5	41.8	0.77	5.43	73.0	10.0	14.5
	15.0	4.3	10.0							55.1	42.3	0.77	5.30	73.1	10.4	13.8
120	9.0	1.7	4.0							Operation not recommended						
	12.0	2.8	6.5							50.8	41.5	0.82	6.09	71.6	8.3	17.5
	15.0	4.2	9.6							51.7	41.9	0.81	5.92	71.9	8.7	16.7

NS070 - Single Speed - PSC

Capacity Data (2200 CFM)

EWT	Flow Rate	Water Pressure Drop		HEATING - EAT 70 °F						COOLING - EAT 80/67 °F						
				HC	Power	HE	LAT		HWC	TC	SC	S/T	Power	HR		HWC
ºF	GPM	PSI	FT/HD	kBtuh	kW	kBtuh	ºF	COP	kBtuh	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20	12.0	3.0	7.0	Operation not recommended						Operation not recommended						
	15.0	4.4	10.2													
	18.0	6.0	13.9	46.0	4.54	30.5	89.4	2.97	6.9							
30	12.0	3.0	6.8	Operation not recommended						Operation not recommended						
	15.0	4.3	9.9	53.0	4.65	37.2	92.3	3.34	7.4	73.6	49.7	0.68	2.87	83.4	25.6	---
	18.0	5.8	13.5	53.2	4.66	37.3	92.4	3.34	7.6	74.0	49.1	0.66	2.86	83.8	25.8	---
40	12.0	2.9	6.6	Operation not recommended						Operation not recommended						
	15.0	4.1	9.6	61.8	4.80	45.5	96.0	3.77	8.2	77.3	52.8	0.68	3.11	87.9	24.9	---
	18.0	5.7	13.1	62.2	4.82	45.8	96.2	3.78	8.4	77.9	52.6	0.67	3.09	88.5	25.2	---
50	12.0	2.8	6.4	68.1	4.91	51.4	98.7	4.07	8.9	80.7	55.5	0.69	3.51	92.7	23.0	4.5
	15.0	4.0	9.3	69.5	4.95	52.7	99.3	4.12	9.2	81.2	55.7	0.69	3.41	92.8	23.8	4.3
	18.0	5.5	12.7	70.1	4.97	53.2	99.5	4.13	9.4	82.0	56.0	0.68	3.38	93.5	24.3	4.1
60	12.0	2.7	6.2	75.6	5.06	58.3	101.8	4.38	10.0	77.3	53.7	0.69	3.81	90.3	20.3	5.5
	15.0	3.9	9.0	77.8	5.11	60.3	102.7	4.46	10.3	77.7	53.9	0.69	3.70	90.3	21.0	5.2
	18.0	5.3	12.3	78.7	5.14	61.2	103.1	4.48	10.6	78.7	54.6	0.69	3.65	91.1	21.5	5.0
70	12.0	2.6	6.0	83.4	5.22	65.6	105.1	4.69	11.3	76.8	54.5	0.71	4.19	91.1	18.3	6.9
	15.0	3.8	8.7	86.4	5.29	68.4	106.4	4.79	11.6	77.1	54.6	0.71	4.08	91.0	18.9	6.6
	18.0	5.1	11.9	87.7	5.33	69.5	106.9	4.82	11.9	78.2	55.8	0.71	4.01	91.9	19.5	6.3
80	12.0	2.5	5.8	89.2	5.36	70.9	107.5	4.88	12.7	73.3	52.2	0.71	4.61	89.1	15.9	8.7
	15.0	3.6	8.4	93.3	5.46	74.6	109.3	5.00	13.1	73.6	52.2	0.71	4.49	88.9	16.4	8.3
	18.0	5.0	11.5	94.9	5.51	76.1	109.9	5.05	13.5	74.8	53.8	0.72	4.40	89.8	17.0	7.9
90	12.0	2.4	5.6	95.4	5.52	76.5	110.1	5.06	14.3	67.0	48.5	0.72	5.06	84.3	13.2	10.9
	15.0	3.5	8.1	100.5	5.64	81.2	112.3	5.22	14.7	67.2	48.4	0.72	4.93	84.0	13.6	10.4
	18.0	4.8	11.1	102.5	5.70	83.0	113.1	5.27	15.2	68.6	50.3	0.73	4.81	85.0	14.2	9.9
100	12.0	2.3	5.4	Operation not recommended						Operation not recommended						
	15.0	3.4	7.8							65.0	47.8	0.74	5.47	83.7	11.9	13.0
	18.0	4.6	10.7							66.4	50.2	0.75	5.33	84.6	12.5	12.3
110	12.0	2.2	5.2							Operation not recommended						
	15.0	3.3	7.5							57.4	42.5	0.74	6.03	77.9	9.5	15.9
	18.0	4.4	10.2							58.8	45.0	0.77	5.85	78.8	10.1	15.1
120	12.0	2.2	5.0							Operation not recommended						
	15.0	3.1	7.2							54.2	43.1	0.79	6.69	77.1	8.1	19.2
	18.0	4.3	9.8							55.7	46.0	0.83	6.47	77.8	8.6	18.2

NS015 - Single Speed - ECM

Capacity Data (500 CFM)

EWT	Flow Rate	Water Pressure Drop		HEATING - EAT 70°F						COOLING - EAT 80/67 °F						
F	GPM	PSI	FT/HD	Airflow CFM	HC kBtuh	Power kW	HE kBtuh	LAT F	COP	Airflow CFM	TC kBtuh	SC kBtuh	S/T Ratio	Power kW	HR kBtuh	EER
20	2.0	0.6	1.4	Operation not recommended						Operation not recommended						
	3.0	1.6	3.7													
	4.0	2.7	6.1	400	10.2	0.94	7.0	91.6	3.19							
				500	10.5	0.95	7.2	87.4	3.22							
30	2.0	0.6	1.4	Operation not recommended						Operation not recommended						
	3.0	1.6	3.7	400	10.9	0.91	7.8	93.3	3.50	400	15.8	9.4	0.60	0.42	17.2	37.2
				500	11.3	0.93	8.1	88.8	3.54	500	16.2	10.5	0.65	0.46	17.7	35.6
	4.0	2.6	6.1	400	11.1	0.91	8.0	93.6	3.58	400	14.9	9.0	0.60	0.48	16.6	31.1
				500	11.4	0.93	8.2	89.1	3.61	500	15.3	10.0	0.65	0.52	17.1	29.7
40	2.0	0.6	1.4	Operation not recommended						Operation not recommended						
	3.0	1.6	3.7	400	12.0	0.93	8.9	95.9	3.78	400	16.2	9.8	0.61	0.49	17.9	33.2
				500	12.4	0.95	9.2	91.0	3.82	500	16.7	10.9	0.66	0.53	18.5	31.8
	4.0	2.6	6.0	400	12.4	0.93	9.2	96.6	3.89	400	15.9	9.7	0.61	0.50	17.6	32.0
				500	12.7	0.95	9.5	91.6	3.93	500	16.4	10.7	0.66	0.54	18.2	30.5
50	2.0	0.6	1.4	400	12.9	0.95	9.6	97.8	3.97	400	16.5	10.1	0.62	0.59	18.5	27.9
				500	13.3	0.97	10.0	92.6	4.01	500	16.9	11.3	0.67	0.64	19.1	26.7
	3.0	1.6	3.7	400	13.3	0.95	10.0	98.7	4.08	400	16.7	10.2	0.61	0.55	18.6	30.2
				500	13.7	0.97	10.4	93.3	4.12	500	17.1	11.4	0.66	0.60	19.2	28.8
	4.0	2.6	6.0	400	13.6	0.96	10.4	99.6	4.19	400	16.9	10.3	0.61	0.52	18.7	32.8
				500	14.1	0.98	10.7	94.1	4.23	500	17.4	11.5	0.66	0.56	19.3	31.3
60	2.0	0.6	1.4	400	14.2	0.97	10.9	101.0	4.31	400	15.6	9.8	0.63	0.68	18.0	23.0
				500	14.7	0.99	11.3	95.2	4.36	500	16.1	10.9	0.68	0.73	18.6	22.0
	3.0	1.6	3.7	400	14.7	0.97	11.4	102.0	4.43	400	15.9	9.9	0.62	0.64	18.0	24.7
				500	15.2	0.99	11.8	96.1	4.47	500	16.3	11.0	0.67	0.69	18.7	23.6
	4.0	2.6	6.0	400	15.2	0.98	11.8	103.1	4.53	400	16.1	10.0	0.62	0.60	18.1	26.6
				500	15.6	1.00	12.2	96.9	4.58	500	16.5	11.1	0.67	0.65	18.7	25.4
70	2.0	0.6	1.4	400	15.6	0.98	12.2	104.1	4.64	400	14.8	9.5	0.64	0.77	17.4	19.3
				500	16.1	1.01	12.7	97.8	4.69	500	15.2	10.5	0.69	0.83	18.1	18.5
	3.0	1.6	3.7	400	16.1	0.99	12.7	105.4	4.76	400	15.0	9.5	0.63	0.73	17.5	20.6
				500	16.6	1.02	13.2	98.8	4.81	500	15.4	10.6	0.69	0.79	18.1	19.7
	4.0	2.6	6.0	400	16.7	1.00	13.2	106.6	4.87	400	15.2	9.6	0.63	0.69	17.6	22.0
				500	17.2	1.03	13.7	99.8	4.92	500	15.7	10.6	0.68	0.75	18.2	21.0
80	2.0	0.6	1.4	400	17.2	1.00	13.8	107.8	5.03	400	14.1	9.2	0.65	0.88	17.1	16.1
				500	17.7	1.02	14.2	100.8	5.08	500	14.5	10.2	0.70	0.94	17.7	15.3
	3.0	1.6	3.7	400	17.8	1.02	14.4	109.3	5.14	400	14.3	9.2	0.64	0.84	17.1	17.0
				500	18.4	1.04	14.8	102.0	5.20	500	14.7	10.2	0.70	0.90	17.8	16.2
	4.0	2.6	5.9	400	18.2	1.02	14.7	110.2	5.21	400	14.5	9.3	0.64	0.79	17.2	18.3
				500	18.8	1.05	15.2	102.8	5.27	500	14.9	10.4	0.70	0.85	17.8	17.5
90	2.0	0.6	1.4	400	18.9	1.02	15.5	111.8	5.44	400	13.4	8.9	0.66	1.00	16.8	13.4
				500	19.5	1.04	16.0	104.2	5.50	500	13.7	9.9	0.72	1.07	17.4	12.8
	3.0	1.6	3.6	400	19.7	1.04	16.1	113.5	5.55	400	13.5	8.9	0.65	0.97	16.8	14.0
				500	20.3	1.06	16.7	105.6	5.61	500	13.9	9.8	0.71	1.04	17.5	13.4
	4.0	2.6	5.9	400	19.8	1.04	16.2	113.7	5.55	400	13.8	9.1	0.66	0.89	16.8	15.5
				500	20.4	1.07	16.7	105.7	5.61	500	14.2	10.1	0.71	0.96	17.4	14.8
100	2.0	0.6	1.4	Operation not recommended						Operation not recommended						
	3.0	1.6	3.6							400	12.9	8.5	0.66	1.11	16.6	11.6
										500	13.2	9.5	0.72	1.19	17.3	11.1
	4.0	2.5	5.9							400	12.9	8.8	0.68	1.00	16.3	13.0
										500	13.3	9.8	0.74	1.07	16.9	12.4
110	2.0	0.6	1.4	Operation not recommended						Operation not recommended						
	3.0	1.6	3.6							400	12.2	8.2	0.68	1.27	16.5	9.6
										500	12.5	9.2	0.73	1.37	17.2	9.1
	4.0	2.5	5.9							400	12.1	8.5	0.71	1.10	15.8	11.0
										500	12.4	9.5	0.76	1.19	16.5	10.5
120	2.0	0.6	1.4	Operation not recommended						Operation not recommended						
	3.0	1.6	3.6							400	11.6	8.0	0.69	1.46	16.6	7.9
										500	11.9	8.8	0.74	1.57	17.3	7.6
	4.0	2.5	5.8							400	10.9	8.3	0.76	1.22	15.1	8.9
										500	11.2	9.2	0.82	1.32	15.7	8.5

NS018 - Single Speed - ECM

Capacity Data (600 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
	3.0	1.8	4.1															
20	4.0	3.0	6.9	Operation not recommended							Operation not recommended							
	5.0	4.3	9.9	500	12.3	1.09	8.6	90.8	3.30	1.6								
				600	12.7	1.12	8.9	87.6	3.34	1.5								
	3.0	1.7	3.9	Operation not recommended							Operation not recommended							
30	4.0	3.0	6.8	500	13.9	1.16	10.0	93.8	3.51	1.6	500	19.0	11.6	0.61	0.65	21.2	29.4	--
				600	14.4	1.19	10.3	90.2	3.55	1.6	600	19.5	12.9	0.66	0.70	21.9	28.1	--
	5.0	4.2	9.7	500	14.2	1.17	10.2	94.2	3.54	1.7	500	18.3	11.2	0.61	0.63	20.4	29.1	--
				600	14.6	1.20	10.5	90.5	3.58	1.6	600	18.8	12.4	0.66	0.68	21.1	27.9	--
	3.0	1.7	3.8	Operation not recommended							Operation not recommended							
40	4.0	2.9	6.7	500	15.4	1.22	11.2	96.5	3.70	1.8	500	19.4	11.7	0.60	0.69	21.8	28.0	--
				600	15.9	1.24	11.6	92.5	3.74	1.6	600	20.0	13.0	0.65	0.75	22.5	26.8	--
	5.0	4.2	9.6	500	15.8	1.23	11.6	97.2	3.76	1.8	500	19.2	11.5	0.60	0.64	21.4	29.9	--
				600	16.3	1.26	12.0	93.1	3.79	1.7	600	19.8	12.8	0.65	0.69	22.1	28.6	--
	3.0	1.6	3.7	500	16.6	1.27	12.3	98.7	3.83	1.9	500	19.6	11.9	0.61	0.82	22.4	23.8	0.9
				600	17.1	1.30	12.7	94.4	3.87	1.7	600	20.1	13.2	0.66	0.89	23.1	22.7	1.0
50	4.0	2.9	6.6	500	17.0	1.28	12.6	99.4	3.89	1.9	500	19.8	11.8	0.60	0.74	22.4	26.8	0.8
				600	17.5	1.31	13.0	95.0	3.93	1.8	600	20.4	13.2	0.64	0.80	23.1	25.7	0.9
	5.0	4.2	9.6	500	17.4	1.29	13.0	100.2	3.95	1.9	500	20.1	11.8	0.59	0.66	22.4	30.7	0.8
				600	17.9	1.32	13.4	95.6	3.99	1.9	600	20.7	13.1	0.63	0.71	23.1	29.4	0.9
	3.0	1.6	3.6	500	18.5	1.33	13.9	102.2	4.08	2.1	500	18.7	11.4	0.61	0.87	21.6	21.5	1.0
				600	19.1	1.36	14.4	97.4	4.12	2.0	600	19.2	12.7	0.66	0.94	22.4	20.5	1.1
60	4.0	2.8	6.6	500	18.8	1.34	14.3	102.9	4.11	2.1	500	18.9	11.4	0.60	0.81	21.7	23.2	1.0
				600	19.4	1.37	14.8	98.0	4.16	2.0	600	19.4	12.6	0.65	0.88	22.4	22.2	1.1
	5.0	4.1	9.5	500	19.2	1.36	14.6	103.6	4.15	2.2	500	19.1	11.3	0.59	0.76	21.7	25.2	0.9
				600	19.8	1.39	15.1	98.6	4.19	2.0	600	19.6	12.6	0.64	0.82	22.4	24.0	1.0
	3.0	1.5	3.5	500	20.4	1.39	15.6	105.7	4.31	2.4	500	17.8	10.9	0.61	0.92	20.9	19.4	1.2
				600	21.0	1.42	16.2	100.4	4.35	2.2	600	18.3	12.1	0.66	0.99	21.7	18.6	1.3
70	4.0	2.8	6.5	500	20.7	1.41	15.9	106.4	4.32	2.4	500	17.9	10.9	0.61	0.89	20.9	20.2	1.1
				600	21.4	1.44	16.5	100.9	4.36	2.2	600	18.4	12.1	0.66	0.96	21.7	19.3	1.3
	5.0	4.1	9.5	500	21.0	1.43	16.2	107.0	4.33	2.4	500	18.0	10.9	0.60	0.86	20.9	20.9	1.1
				600	21.7	1.46	16.7	101.5	4.37	2.2	600	18.5	12.1	0.65	0.93	21.7	20.0	1.2
	3.0	1.5	3.4	500	22.6	1.45	17.7	109.9	4.57	2.7	500	17.0	10.4	0.61	0.97	20.3	17.6	1.6
				600	23.3	1.48	18.3	104.0	4.62	2.5	600	17.5	11.6	0.66	1.04	21.0	16.8	1.7
80	4.0	2.8	6.4	500	22.9	1.48	17.9	110.4	4.55	2.7	500	17.0	10.4	0.61	0.97	20.3	17.5	1.5
				600	23.6	1.51	18.5	104.5	4.60	2.4	600	17.5	11.6	0.66	1.05	21.1	16.7	1.6
	5.0	4.1	9.4	500	23.3	1.49	18.2	111.1	4.58	2.7	500	17.2	10.6	0.62	0.95	20.4	18.1	1.4
				600	24.0	1.52	18.8	105.0	4.63	2.5	600	17.7	11.8	0.67	1.02	21.1	17.3	1.5
	3.0	1.4	3.2	500	25.1	1.52	19.9	114.4	4.85	3.0	500	16.2	10.0	0.62	1.02	19.7	15.9	1.9
				600	25.8	1.55	20.6	107.9	4.90	2.8	600	16.7	11.1	0.67	1.10	20.4	15.2	2.1
90	4.0	2.7	6.3	500	25.3	1.55	20.0	114.9	4.79	3.0	500	16.2	10.0	0.62	1.07	19.8	15.1	1.8
				600	26.1	1.58	20.7	108.3	4.84	2.8	600	16.6	11.1	0.67	1.15	20.5	14.5	2.0
	5.0	4.0	9.2	500	25.5	1.55	20.2	115.2	4.81	3.1	500	16.3	10.3	0.63	1.04	19.9	15.7	1.7
				600	26.3	1.59	20.9	108.6	4.86	2.9	600	16.8	11.4	0.68	1.12	20.6	15.0	1.9
	3.0	1.4	3.1								Operation not recommended							
100	4.0	2.7	6.2								500	15.3	9.6	0.63	1.17	19.3	13.1	2.2
											600	15.8	10.7	0.68	1.26	20.1	12.5	2.4
	5.0	4.0	9.1								500	15.3	9.9	0.65	1.19	19.4	12.9	2.0
											600	15.8	11.1	0.70	1.28	20.1	12.3	2.3
	3.0	1.3	3.0								Operation not recommended							
110	4.0	2.7	6.1								500	14.6	9.2	0.63	1.28	19.0	11.4	2.9
											600	15.0	10.2	0.68	1.38	19.7	10.9	3.2
	5.0	3.9	9.0								500	14.3	9.6	0.67	1.33	18.9	10.7	2.6
											600	14.7	10.7	0.73	1.44	19.6	10.2	3.0
	3.0	1.3	2.9								Operation not recommended							
120	4.0	2.6	6.1								500	13.8	8.8	0.64	1.41	18.6	9.8	3.5
											600	14.2	9.8	0.69	1.51	19.4	9.4	4.0
	5.0	3.9	8.9								500	13.3	9.2	0.69	1.48	18.4	9.0	3.1
											600	13.7	10.2	0.74	1.60	19.1	8.6	3.5

NS022 - Single Speed - ECM

Capacity Data (700 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
	3.0	0.9	2.2	Operation not recommended							Operation not recommended							
20	4.5	1.8	4.2															
	6.0	2.9	6.8	600	12.3	1.18	8.3	89.0	3.06	1.6								
				700	12.5	1.19	8.4	86.5	3.08	1.5								
	3.0	0.9	2.1	Operation not recommended							Operation not recommended							
30	4.5	1.7	4.0	600	14.5	1.19	10.4	92.3	3.56	1.7	600	23.4	15.8	0.68	0.66	25.7	35.6	---
				700	14.8	1.20	10.7	89.5	3.61	1.6	700	23.8	17.3	0.73	0.69	26.2	34.4	---
	6.0	2.8	6.6	600	14.8	1.20	10.7	92.8	3.61	1.8	600	23.6	15.8	0.67	0.64	25.7	36.9	---
				700	15.0	1.21	10.8	89.8	3.62	1.6	700	24.1	17.3	0.72	0.67	26.4	36.0	---
	3.0	0.9	2.0	Operation not recommended							Operation not recommended							
40	4.5	1.7	3.9	600	17.0	1.22	12.9	96.3	4.10	1.9	600	24.2	15.8	0.65	0.72	26.7	33.6	---
				700	17.4	1.22	13.2	93.0	4.17	1.8	700	24.6	17.3	0.70	0.75	27.2	32.7	---
	6.0	2.8	6.4	600	17.3	1.23	13.1	96.8	4.12	2.0	600	24.4	15.8	0.65	0.70	26.8	34.9	---
				700	17.7	1.23	13.5	93.4	4.20	1.8	700	24.9	17.3	0.69	0.73	27.4	34.2	---
	3.0	0.9	2.0	600	18.5	1.22	14.3	98.6	4.43	2.1	600	24.6	15.6	0.63	0.84	27.5	29.2	1.1
				700	18.9	1.22	14.7	95.0	4.52	2.0	700	25.2	17.0	0.67	0.88	28.2	28.7	1.2
50	4.5	1.6	3.8	600	19.5	1.25	15.2	100.0	4.56	2.2	600	24.9	15.7	0.63	0.80	27.6	31.1	1.0
				700	19.8	1.25	15.6	96.2	4.64	2.0	700	25.4	17.1	0.67	0.84	28.3	30.4	1.1
	6.0	2.7	6.2	600	19.7	1.27	15.4	100.5	4.56	2.2	600	25.2	15.7	0.63	0.78	27.8	32.4	1.0
				700	20.2	1.26	15.9	96.7	4.70	2.1	700	25.7	17.1	0.67	0.81	28.4	31.7	1.1
	3.0	0.8	1.9	600	20.9	1.27	16.6	102.3	4.82	2.4	600	23.9	15.4	0.65	0.94	27.1	25.3	1.3
				700	21.4	1.26	17.1	98.3	4.98	2.2	700	24.3	16.8	0.69	0.98	27.7	24.8	1.4
60	4.5	1.6	3.7	600	21.9	1.30	17.5	103.8	4.94	2.4	600	24.1	15.6	0.65	0.89	27.1	26.9	1.2
				700	22.4	1.29	18.0	99.7	5.10	2.3	700	24.6	17.0	0.69	0.93	27.8	26.4	1.3
	6.0	2.6	6.0	600	22.2	1.31	17.8	104.3	4.96	2.5	600	24.3	15.6	0.64	0.87	27.3	28.0	1.1
				700	22.8	1.30	18.4	100.2	5.15	2.3	700	24.8	17.0	0.68	0.90	27.9	27.5	1.3
	3.0	0.8	1.8	600	23.3	1.32	18.8	106.0	5.17	2.7	600	23.6	15.3	0.65	1.07	27.2	22.0	1.6
				700	23.9	1.30	19.4	101.6	5.40	2.5	700	24.0	16.6	0.69	1.11	27.8	21.6	1.7
70	4.5	1.5	3.6	600	24.3	1.35	19.7	107.6	5.29	2.7	600	23.7	15.4	0.65	1.01	27.2	23.5	1.5
				700	25.1	1.33	20.5	103.2	5.52	2.5	700	24.3	16.8	0.69	1.05	27.9	23.1	1.7
	6.0	2.5	5.8	600	24.8	1.37	20.1	108.3	5.32	2.8	600	24.0	15.4	0.64	0.99	27.4	24.4	1.4
				700	25.5	1.34	20.9	103.7	5.57	2.6	700	24.5	16.8	0.69	1.02	28.0	24.0	1.6
	3.0	0.8	1.8	600	25.4	1.38	20.7	109.1	5.40	3.0	600	22.5	15.0	0.66	1.21	26.7	18.6	2.0
				700	26.1	1.34	21.5	104.5	5.70	2.8	700	23.0	16.2	0.71	1.26	27.3	18.3	2.2
80	4.5	1.5	3.4	600	26.5	1.41	21.7	110.8	5.51	3.1	600	22.7	15.1	0.66	1.15	26.7	19.8	1.9
				700	27.3	1.37	22.7	106.2	5.84	2.8	700	23.3	16.4	0.71	1.19	27.3	19.6	2.1
	6.0	2.4	5.6	600	26.9	1.42	22.1	111.6	5.54	3.2	600	23.0	15.1	0.66	1.11	26.8	20.7	1.8
				700	27.8	1.39	23.1	106.8	5.88	2.9	700	23.4	16.4	0.70	1.15	27.4	20.3	2.0
	3.0	0.7	1.7	600	27.5	1.44	22.5	112.4	5.59	3.3	600	20.9	14.6	0.70	1.38	25.6	15.2	2.5
				700	28.4	1.40	23.6	107.5	5.96	3.1	700	21.4	15.8	0.74	1.42	26.2	15.0	2.7
90	4.5	1.4	3.3	600	28.6	1.47	23.6	114.2	5.70	3.4	600	21.1	14.8	0.70	1.31	25.5	16.1	2.4
				700	29.7	1.42	24.8	109.2	6.11	3.2	700	21.5	16.0	0.74	1.34	26.1	16.1	2.6
	6.0	2.3	5.4	600	29.1	1.49	24.0	114.9	5.72	3.5	600	21.4	14.8	0.69	1.26	25.7	16.9	2.2
				700	30.2	1.44	25.3	109.9	6.15	3.3	700	21.7	16.0	0.74	1.31	26.2	16.7	2.4
	3.0	0.7	1.7								Operation not recommended							
100	4.5	1.4	3.2								600	20.2	14.4	0.71	1.48	25.2	13.6	2.9
											700	20.6	15.6	0.76	1.52	25.8	13.5	3.2
	6.0	2.2	5.2								600	20.4	14.4	0.70	1.43	25.3	14.2	2.7
											700	20.8	15.6	0.75	1.48	25.9	14.1	3.0
	3.0	0.7	1.6								Operation not recommended							
110	4.5	1.3	3.1								600	18.1	13.8	0.76	1.67	23.8	10.9	3.6
											700	18.5	15.0	0.81	1.72	24.3	10.8	3.9
	6.0	2.2	5.0								600	18.3	13.8	0.76	1.62	23.8	11.3	3.3
											700	18.7	15.0	0.81	1.67	24.3	11.2	3.7
	3.0	0.7	1.5								Operation not recommended							
120	4.5	1.3	2.9								600	16.8	13.4	0.79	1.89	23.3	8.9	4.3
											700	17.1	14.5	0.85	1.94	23.8	8.8	4.7
	6.0	2.1	4.8								600	17.0	13.4	0.79	1.83	23.2	9.3	4.0
											700	17.3	14.5	0.84	1.89	23.8	9.2	4.4

NS030 - Single Speed - ECM

Capacity Data (900 CFM)

EWT	Flow Rate	Water Pressure Drop		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
				Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20				Operation not recommended							Operation not recommended							
	6.0	3.1	7.2															
	8.0	5.2	12.1	700	16.9	1.52	11.7	92.4	3.26	2.2								
				900	17.2	1.55	11.9	87.7	3.25	2.0								
30	4.0	1.5	3.4	Operation not recommended							Operation not recommended							
	6.0	3.0	7.0	700	19.4	1.51	14.2	95.7	3.77	2.4	700	26.1	16.7	0.64	0.87	29.1	30.0	---
				900	19.8	1.54	14.6	90.4	3.77	2.2	900	26.8	18.7	0.70	0.94	30.0	28.5	---
	8.0	5.1	11.8	700	19.9	1.53	14.7	96.3	3.82	2.4	700	26.3	16.7	0.63	0.85	29.2	30.8	---
				900	20.2	1.56	14.9	90.8	3.81	2.2	900	27.3	18.7	0.68	0.91	30.4	30.0	---
40	4.0	1.4	3.3	Operation not recommended							Operation not recommended							
	6.0	2.9	6.8	700	22.7	1.56	17.4	100.1	4.27	2.6	700	28.3	18.0	0.64	0.95	31.5	29.7	---
				900	23.3	1.58	17.9	93.9	4.31	2.4	900	29.1	20.2	0.70	1.02	32.6	28.4	---
	8.0	4.9	11.4	700	23.3	1.58	17.9	100.8	4.32	2.7	700	28.5	18.0	0.63	0.93	31.7	30.5	---
				900	23.8	1.60	18.3	94.5	4.36	2.5	900	29.5	20.2	0.68	0.99	32.9	29.7	---
50	4.0	1.4	3.2	700	24.9	1.60	19.4	102.9	4.55	2.8	700	30.2	19.3	0.64	1.10	34.0	27.5	1.4
				900	25.5	1.62	20.0	96.2	4.61	2.6	900	31.1	21.7	0.70	1.17	35.1	26.6	1.5
	6.0	2.8	6.6	700	25.7	1.61	20.2	104.0	4.68	2.9	700	30.3	19.5	0.64	1.06	33.9	28.6	1.3
				900	26.4	1.63	20.8	97.1	4.75	2.7	900	31.2	21.8	0.70	1.13	35.0	27.7	1.4
	8.0	4.8	11.1	700	26.3	1.63	20.7	104.8	4.72	3.0	700	30.6	19.5	0.64	1.04	34.1	29.5	1.2
				900	26.9	1.64	21.3	97.7	4.81	2.8	900	31.6	21.8	0.69	1.10	35.3	28.7	1.4
60	4.0	1.4	3.1	700	27.9	1.67	22.2	107.0	4.90	3.2	700	29.5	18.9	0.64	1.21	33.6	24.4	1.7
				900	28.7	1.67	23.0	99.5	5.02	3.0	900	30.4	21.3	0.70	1.28	34.7	23.7	1.8
	6.0	2.8	6.4	700	28.9	1.69	23.1	108.2	5.01	3.3	700	29.6	19.1	0.65	1.16	33.5	25.4	1.6
				900	29.7	1.69	23.9	100.6	5.16	3.0	900	30.5	21.3	0.70	1.23	34.7	24.7	1.7
	8.0	4.6	10.7	700	29.5	1.71	23.6	109.0	5.05	3.4	700	29.9	19.1	0.64	1.14	33.8	26.2	1.5
				900	30.3	1.70	24.5	101.1	5.21	3.1	900	30.8	21.4	0.69	1.20	34.9	25.6	1.6
70	4.0	1.3	3.0	700	31.1	1.76	25.1	111.1	5.19	3.6	700	29.7	19.2	0.65	1.35	34.3	22.0	2.1
				900	32.0	1.75	26.0	102.9	5.36	3.3	900	30.6	21.6	0.71	1.42	35.4	21.5	2.2
	6.0	2.7	6.2	700	32.1	1.78	26.0	112.5	5.28	3.7	700	29.7	19.3	0.65	1.30	34.2	22.9	2.0
				900	33.1	1.76	27.1	104.1	5.50	3.4	900	30.6	21.6	0.70	1.37	35.3	22.4	2.1
	8.0	4.5	10.4	700	32.7	1.81	26.5	113.2	5.31	3.8	700	30.1	19.3	0.64	1.27	34.4	23.6	1.8
				900	33.7	1.78	27.6	104.6	5.53	3.5	900	31.0	21.7	0.70	1.34	35.5	23.1	2.0
80	4.0	1.3	2.9	700	33.6	1.84	27.3	114.4	5.36	4.0	700	28.4	19.0	0.67	1.51	33.6	18.9	2.6
				900	34.7	1.81	28.5	105.7	5.61	3.7	900	29.3	21.3	0.73	1.58	34.7	18.5	2.8
	6.0	2.6	5.9	700	34.8	1.87	28.4	116.0	5.46	4.1	700	28.6	19.1	0.67	1.45	33.5	19.7	2.5
				900	36.0	1.83	29.7	107.0	5.75	3.8	900	29.4	21.3	0.72	1.52	34.6	19.4	2.7
	8.0	4.3	10.0	700	35.3	1.89	28.9	116.7	5.47	4.3	700	28.8	19.1	0.66	1.42	33.7	20.3	2.3
				900	36.5	1.85	30.2	107.6	5.77	3.9	900	29.7	21.4	0.72	1.49	34.8	19.9	2.5
90	4.0	1.2	2.8	700	36.2	1.94	29.6	117.8	5.47	4.5	700	26.3	18.0	0.68	1.68	32.0	15.6	3.3
				900	37.4	1.89	31.0	108.5	5.80	4.2	900	27.1	20.1	0.74	1.75	33.1	15.5	3.5
	6.0	2.5	5.7	700	37.5	1.97	30.8	119.6	5.59	4.6	700	26.5	18.0	0.68	1.62	32.0	16.4	3.1
				900	38.9	1.92	32.3	110.0	5.93	4.3	900	27.3	20.1	0.74	1.68	33.0	16.2	3.3
	8.0	4.2	9.6	700	38.0	2.00	31.2	120.3	5.58	4.8	700	26.7	18.1	0.68	1.58	32.1	16.9	2.8
				900	39.5	1.94	32.8	110.6	5.95	4.4	900	27.6	20.2	0.73	1.65	33.2	16.7	3.2
100	4.0	1.2	2.7								Operation not recommended							
	6.0	2.4	5.5								700	25.3	18.0	0.71	1.83	31.5	13.8	3.8
											900	26.0	20.1	0.77	1.89	32.5	13.8	4.1
	8.0	4.0	9.3								700	25.5	18.1	0.71	1.79	31.6	14.3	3.5
											900	26.3	20.2	0.77	1.85	32.6	14.2	3.9
110	4.0	1.1	2.6								Operation not recommended							
	6.0	2.3	5.3	Operation not recommended							700	21.5	16.9	0.79	2.04	28.5	10.6	4.6
											900	22.2	18.8	0.85	2.10	29.3	10.6	5.0
	8.0	3.9	8.9								700	21.7	17.0	0.78	1.99	28.5	10.9	4.3
											900	22.4	18.9	0.84	2.05	29.4	10.9	4.7
120	4.0	1.1	2.5								Operation not recommended							
	6.0	2.2	5.1								700	20.8	16.3	0.78	2.30	28.7	9.1	5.5
											900	21.4	18.1	0.85	2.35	29.5	9.1	6.0
	8.0	3.7	8.6								700	20.9	16.4	0.78	2.25	28.6	9.3	5.1
											900	21.7	18.2	0.84	2.30	29.5	9.4	5.7

NS036 - Single Speed - ECM

Capacity Data (1250 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20	7.0	2.1	4.9	Operation not recommended							Operation not recommended							
	9.0	3.6	8.2	1050	21.0	1.83	14.8	88.5	3.36	2.7								
				1250	21.4	1.87	15.0	85.8	3.35	2.4								
30	5.0	1.0	2.3	Operation not recommended							Operation not recommended							
	7.0	2.1	4.7	1050	23.6	1.84	17.3	90.8	3.76	2.9	1050	29.9	19.3	0.65	1.06	33.5	28.1	---
				1250	24.1	1.88	17.7	87.8	3.76	2.6	1250	30.7	21.6	0.70	1.15	34.7	26.7	---
	9.0	3.5	8.0	1050	24.2	1.86	17.9	91.3	3.82	3.0	1050	30.1	19.2	0.64	1.05	33.7	28.8	---
				1250	24.6	1.89	18.1	88.2	3.81	2.7	1250	31.2	21.5	0.69	1.11	35.0	28.1	---
40	5.0	1.0	2.3	Operation not recommended							Operation not recommended							
	7.0	2.0	4.6	1050	27.4	1.89	20.9	94.2	4.24	3.2	1050	32.7	21.5	0.66	1.17	36.7	28.1	---
				1250	28.0	1.92	21.5	90.8	4.28	3.0	1250	33.7	24.1	0.71	1.25	38.0	26.9	---
	9.0	3.4	7.8	1050	28.0	1.92	21.5	94.7	4.29	3.3	1050	33.0	21.4	0.65	1.14	36.9	28.9	---
				1250	28.6	1.94	22.0	91.2	4.33	3.0	1250	34.2	24.0	0.70	1.21	38.3	28.1	---
50	5.0	1.0	2.2	1050	29.8	1.94	23.2	96.3	4.52	3.5	1050	35.3	23.2	0.66	1.34	39.9	26.3	1.7
				1250	30.5	1.95	23.8	92.6	4.58	3.2	1250	36.3	26.1	0.72	1.43	41.2	25.5	1.8
	7.0	1.9	4.5	1050	30.8	1.94	24.2	97.1	4.64	3.6	1050	35.4	23.4	0.66	1.29	39.8	27.4	1.6
				1250	31.6	1.96	24.9	93.4	4.72	3.3	1250	36.4	26.2	0.72	1.38	41.1	26.5	1.7
	9.0	3.3	7.5	1050	31.5	1.97	24.7	97.7	4.68	3.7	1050	35.7	23.4	0.65	1.27	40.0	28.2	1.4
				1250	32.2	1.98	25.5	93.9	4.78	3.4	1250	36.9	26.2	0.71	1.34	41.5	27.5	1.6
60	5.0	0.9	2.1	1050	33.4	1.99	26.6	99.4	4.92	3.9	1050	35.0	23.7	0.68	1.46	40.0	23.9	2.0
				1250	34.3	1.99	27.5	95.4	5.04	3.6	1250	36.1	26.7	0.74	1.55	41.4	23.2	2.1
	7.0	1.9	4.3	1050	34.5	2.01	27.6	100.4	5.03	4.0	1050	35.1	23.9	0.68	1.41	39.9	24.9	1.9
				1250	35.5	2.01	28.6	96.3	5.18	3.7	1250	36.2	26.7	0.74	1.49	41.2	24.2	2.0
	9.0	3.1	7.3	1050	35.2	2.04	28.2	101.0	5.06	4.2	1050	35.5	23.9	0.67	1.38	40.2	25.7	1.7
				1250	36.2	2.03	29.2	96.8	5.23	3.8	1250	36.6	26.8	0.73	1.46	41.6	25.0	1.9
70	5.0	0.9	2.1	1050	37.1	2.05	30.1	102.8	5.31	4.4	1050	35.5	24.7	0.69	1.62	41.0	21.9	2.5
				1250	38.2	2.04	31.3	98.3	5.48	4.1	1250	36.6	27.7	0.76	1.71	42.4	21.3	2.6
	7.0	1.8	4.2	1050	38.4	2.09	31.3	103.9	5.40	4.5	1050	35.6	24.8	0.70	1.57	40.9	22.7	2.3
				1250	39.6	2.06	32.6	99.3	5.63	4.2	1250	36.7	27.7	0.76	1.65	42.3	22.3	2.5
	9.0	3.0	7.0	1050	39.1	2.11	31.9	104.5	5.43	4.7	1050	36.0	24.8	0.69	1.53	41.2	23.5	2.2
				1250	40.3	2.09	33.2	99.8	5.66	4.3	1250	37.1	27.8	0.75	1.62	42.6	23.0	2.4
80	5.0	0.9	2.0	1050	40.1	2.11	32.9	105.4	5.57	4.9	1050	34.6	24.6	0.71	1.80	40.8	19.2	3.1
				1250	41.4	2.08	34.3	100.7	5.83	4.6	1250	35.7	27.5	0.77	1.89	42.1	18.9	3.3
	7.0	1.7	4.0	1050	41.6	2.15	34.3	106.7	5.68	5.1	1050	34.8	24.6	0.71	1.73	40.7	20.0	2.9
				1250	43.0	2.11	35.8	101.8	5.97	4.7	1250	35.8	27.5	0.77	1.81	42.0	19.8	3.1
	9.0	2.9	6.8	1050	42.2	2.18	34.8	107.2	5.69	5.2	1050	35.1	24.7	0.70	1.70	40.9	20.7	2.7
				1250	43.7	2.13	36.4	102.3	6.00	4.8	1250	36.2	27.6	0.76	1.78	42.3	20.3	3.0
90	5.0	0.8	1.9	1050	43.3	2.18	35.9	108.2	5.82	5.5	1050	32.5	23.9	0.74	1.99	39.2	16.3	3.9
				1250	44.9	2.13	37.6	103.2	6.16	5.1	1250	33.5	26.7	0.80	2.07	40.6	16.1	4.1
	7.0	1.7	3.9	1050	45.0	2.22	37.4	109.6	5.95	5.7	1050	32.7	23.9	0.73	1.92	39.2	17.0	3.6
				1250	46.6	2.17	39.2	104.5	6.31	5.3	1250	33.7	26.7	0.79	1.99	40.5	16.9	3.9
	9.0	2.8	6.6	1050	45.5	2.25	37.9	110.2	5.93	5.9	1050	33.0	24.0	0.73	1.87	39.4	17.6	3.4
				1250	47.3	2.19	39.8	105.0	6.32	5.4	1250	34.0	26.8	0.79	1.96	40.7	17.4	3.7
100	5.0	0.8	1.8	Operation not recommended							Operation not recommended							
	7.0	1.6	3.8								1050	31.8	23.8	0.75	2.15	39.1	14.8	4.5
											1250	32.7	26.5	0.81	2.22	40.3	14.8	4.8
	9.0	2.7	6.3								1050	32.0	23.9	0.75	2.10	39.2	15.3	4.1
											1250	33.1	26.6	0.81	2.18	40.5	15.2	4.6
110	5.0	0.8	1.8								Operation not recommended							
	7.0	1.6	3.6	Operation not recommended							1050	28.6	22.1	0.77	2.38	36.7	12.0	5.4
											1250	29.5	24.6	0.84	2.45	37.8	12.0	5.9
	9.0	2.6	6.1								1050	28.8	22.2	0.77	2.32	36.8	12.4	5.0
											1250	29.8	24.7	0.83	2.39	38.0	12.4	5.6
120	5.0	0.7	1.7								Operation not recommended							
	7.0	1.5	3.5								1050	26.9	21.8	0.81	2.66	35.9	10.1	6.5
											1250	27.6	24.2	0.88	2.72	36.9	10.1	7.1
	9.0	2.5	5.8								1050	27.0	22.0	0.81	2.60	35.9	10.4	6.1
											1250	28.0	24.3	0.87	2.66	37.0	10.5	6.7

NS042 - Single Speed - ECM

Capacity Data (1350 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20				Operation not recommended							Operation not recommended							
	8.0	2.3	5.3															
	11.0	4.4	10.3	1150	24.0	2.12	16.8	89.3	3.32	4.1								
				1350	24.3	2.10	17.1	86.7	3.39	3.7								
30	5.0	0.8	1.8	Operation not recommended							Operation not recommended							
	8.0	2.2	5.1	1150	27.9	2.16	20.6	92.5	3.80	4.3	1150	40.2	25.0	0.62	1.37	44.9	29.3	---
				1350	28.3	2.14	21.0	89.4	3.87	3.9	1350	42.1	28.1	0.67	1.45	47.0	29.0	---
	11.0	4.3	10.0	1150	28.3	2.16	21.0	92.8	3.85	4.4	1150	40.6	25.0	0.62	1.33	45.1	30.5	---
				1350	28.7	2.14	21.4	89.7	3.93	4.0	1350	42.5	28.1	0.66	1.41	47.3	30.2	---
40	5.0	0.8	1.8	Operation not recommended							Operation not recommended							
	8.0	2.1	4.9	1150	31.8	2.24	24.1	95.6	4.15	4.7	1150	41.9	26.7	0.64	1.46	46.9	28.7	---
				1350	32.3	2.21	24.7	92.1	4.28	4.3	1350	43.8	30.0	0.68	1.54	49.0	28.4	---
	11.0	4.2	9.7	1150	32.4	2.25	24.7	96.1	4.21	4.9	1150	42.3	26.7	0.63	1.42	47.2	29.9	---
				1350	32.9	2.21	25.3	92.5	4.35	4.4	1350	44.2	30.0	0.68	1.49	49.3	29.6	---
50	5.0	0.7	1.7	1150	34.2	2.26	26.5	97.5	4.44	5.1	1150	42.6	27.5	0.65	1.65	48.3	25.8	2.5
				1350	34.8	2.21	27.2	93.8	4.61	4.7	1350	44.4	30.9	0.70	1.74	50.3	25.5	2.6
	8.0	2.1	4.8	1150	35.6	2.31	27.7	98.7	4.52	5.3	1150	43.1	27.8	0.65	1.58	48.4	27.3	2.3
				1350	36.2	2.26	28.5	94.8	4.71	4.8	1350	44.8	31.3	0.70	1.66	50.5	27.0	2.5
	11.0	4.1	9.4	1150	36.3	2.32	28.4	99.3	4.58	5.4	1150	43.5	27.8	0.64	1.53	48.7	28.4	2.1
				1350	37.0	2.27	29.3	95.4	4.78	5.0	1350	45.3	31.3	0.69	1.61	50.8	28.1	2.4
60	5.0	0.7	1.7	1150	37.5	2.32	29.6	100.2	4.73	5.7	1150	42.5	28.2	0.66	1.82	48.7	23.4	3.0
				1350	38.3	2.26	30.5	96.2	4.96	5.3	1350	44.1	31.7	0.72	1.91	50.6	23.1	3.2
	8.0	2.0	4.6	1150	39.2	2.39	31.0	101.6	4.80	5.9	1150	43.0	28.5	0.66	1.73	48.9	24.9	2.8
				1350	40.0	2.32	32.1	97.4	5.06	5.4	1350	44.7	32.0	0.72	1.81	50.9	24.6	3.0
	11.0	3.9	9.1	1150	40.1	2.41	31.9	102.3	4.87	6.1	1150	43.4	28.5	0.66	1.68	49.2	25.9	2.6
				1350	41.0	2.34	33.0	98.1	5.14	5.6	1350	45.1	32.0	0.71	1.76	51.1	25.6	2.9
70	5.0	0.7	1.6	1150	40.7	2.40	32.5	102.8	4.97	6.4	1150	42.6	29.1	0.68	2.01	49.5	21.2	3.8
				1350	41.6	2.32	33.7	98.6	5.26	6.0	1350	44.2	32.7	0.74	2.10	51.4	21.0	4.0
	8.0	1.9	4.5	1150	42.7	2.48	34.2	104.4	5.04	6.6	1150	43.3	29.4	0.68	1.91	49.8	22.7	3.5
				1350	43.7	2.39	35.5	100.0	5.36	6.1	1350	44.9	33.1	0.74	2.00	51.7	22.5	3.8
	11.0	3.8	8.8	1150	43.8	2.51	35.2	105.2	5.11	6.8	1150	43.7	29.4	0.67	1.85	50.0	23.6	3.3
				1350	44.9	2.42	36.6	100.8	5.45	6.3	1350	45.3	33.1	0.73	1.94	51.9	23.4	3.6
80	5.0	0.7	1.6	1150	43.7	2.44	35.4	105.2	5.26	7.2	1150	41.0	28.5	0.69	2.24	48.7	18.4	4.8
				1350	44.9	2.34	36.9	100.8	5.63	6.7	1350	42.4	32.0	0.75	2.33	50.4	18.2	5.1
	8.0	1.9	4.3	1150	46.0	2.54	37.4	107.0	5.32	7.5	1150	41.8	28.8	0.69	2.12	49.0	19.7	4.5
				1350	47.3	2.42	39.0	102.4	5.72	6.9	1350	43.2	32.3	0.75	2.21	50.7	19.5	4.8
	11.0	3.7	8.5	1150	47.3	2.57	38.6	108.1	5.39	7.7	1150	42.2	28.8	0.68	2.06	49.2	20.5	4.1
				1350	48.7	2.46	40.3	103.4	5.82	7.1	1350	43.6	32.3	0.74	2.15	50.9	20.3	4.6
90	5.0	0.7	1.5	1150	46.7	2.48	38.2	107.6	5.51	8.1	1150	38.9	27.6	0.71	2.50	47.4	15.6	6.0
				1350	48.0	2.37	40.0	102.9	5.95	7.5	1350	40.1	31.1	0.78	2.60	48.9	15.4	6.4
	8.0	1.8	4.2	1150	49.2	2.60	40.4	109.6	5.55	8.4	1150	39.7	27.9	0.70	2.36	47.7	16.8	5.6
				1350	50.8	2.47	42.4	104.8	6.03	7.8	1350	40.9	31.4	0.77	2.46	49.3	16.6	6.1
	11.0	3.5	8.2	1150	50.8	2.64	41.8	110.9	5.63	8.6	1150	40.1	27.9	0.70	2.29	47.9	17.5	5.2
				1350	52.4	2.51	43.9	106.0	6.14	8.0	1350	41.3	31.4	0.76	2.39	49.4	17.3	5.8
100	5.0	0.6	1.5	Operation not recommended							Operation not recommended							
	8.0	1.7	4.0								1150	38.2	27.4	0.72	2.63	47.1	14.5	6.9
											1350	39.2	30.8	0.78	2.73	48.6	14.4	7.5
	11.0	3.4	7.9								1150	38.5	27.4	0.71	2.55	47.3	15.1	6.4
											1350	39.6	30.8	0.78	2.65	48.7	15.0	7.2
110	5.0	0.6	1.4								Operation not recommended							
	8.0	1.7	3.9	Operation not recommended							1150	34.8	25.3	0.73	2.93	44.8	11.9	8.5
											1350	35.7	28.5	0.80	3.04	46.1	11.7	9.2
	11.0	3.3	7.6								1150	35.1	25.3	0.72	2.85	44.9	12.3	7.9
											1350	36.0	28.5	0.79	2.95	46.1	12.2	8.8
120	5.0	0.6	1.3								Operation not recommended							
	8.0	1.6	3.7								1150	32.8	25.0	0.76	3.26	43.9	10.1	10.3
											1350	33.5	28.1	0.84	3.37	45.1	9.9	11.1
	11.0	3.2	7.3								1150	33.1	25.0	0.76	3.17	43.9	10.5	9.5
											1350	33.9	28.1	0.83	3.27	45.1	10.4	10.6

NS048 - Single Speed - ECM

Capacity Data (1500 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20	9.0	2.3	5.4	Operation not recommended							Operation not recommended							
	12.0	4.0	9.2	1300	31.6	2.84	21.9	92.5	3.26	5.3								
				1500	32.0	2.82	22.4	89.7	3.33	4.8								
	6.0	1.1	2.5	Operation not recommended							Operation not recommended							
30	9.0	2.3	5.3	1300	36.3	2.92	26.3	95.8	3.64	5.6	1300	48.2	30.2	0.63	1.61	53.7	29.9	---
				1500	36.7	2.90	26.8	92.6	3.71	5.2	1500	50.5	33.9	0.67	1.70	56.3	29.6	---
	12.0	3.9	9.0	1300	36.8	2.93	26.8	96.2	3.68	5.8	1300	48.7	30.2	0.62	1.56	54.0	31.2	---
				1500	37.2	2.90	27.3	93.0	3.76	5.3	1500	51.0	33.9	0.66	1.66	56.6	30.8	---
	6.0	1.1	2.5	Operation not recommended							Operation not recommended							
40	9.0	2.2	5.1	1300	41.7	3.05	31.3	99.7	4.00	6.2	1300	50.1	31.9	0.64	1.77	56.1	28.3	---
				1500	42.2	3.00	32.0	96.1	4.13	5.7	1500	52.3	35.8	0.68	1.87	58.7	28.0	---
	12.0	3.8	8.7	1300	42.4	3.06	31.9	100.2	4.06	6.4	1300	50.6	31.9	0.63	1.72	56.5	29.5	---
				1500	43.0	3.01	32.7	96.5	4.19	5.8	1500	52.9	35.8	0.68	1.81	59.0	29.2	---
	6.0	1.0	2.4	1300	44.7	3.09	34.1	101.8	4.24	6.7	1300	51.2	33.1	0.65	2.06	58.2	24.9	2.9
				1500	45.4	3.02	35.1	98.0	4.40	6.2	1500	53.3	37.2	0.70	2.17	60.7	24.6	3.1
50	9.0	2.1	4.9	1300	46.5	3.16	35.7	103.1	4.32	6.9	1300	51.7	33.4	0.65	1.96	58.4	26.3	2.7
				1500	47.3	3.08	36.7	99.2	4.49	6.4	1500	53.9	37.6	0.70	2.07	60.9	26.1	2.9
	12.0	3.7	8.4	1300	47.4	3.18	36.6	103.8	4.37	7.2	1300	52.2	33.4	0.64	1.91	58.7	27.4	2.5
				1500	48.2	3.10	37.7	99.8	4.56	6.5	1500	54.4	37.6	0.69	2.01	61.3	27.1	2.8
	6.0	1.0	2.3	1300	49.1	3.18	38.2	105.0	4.52	7.6	1300	50.0	32.7	0.65	2.29	57.8	21.9	3.5
				1500	50.0	3.10	39.5	100.9	4.74	7.0	1500	51.9	36.7	0.71	2.40	60.1	21.6	3.7
60	9.0	2.1	4.8	1300	51.3	3.28	40.1	106.5	4.59	7.8	1300	50.6	33.0	0.65	2.17	58.0	23.3	3.3
				1500	52.3	3.18	41.5	102.3	4.83	7.2	1500	52.6	37.1	0.71	2.28	60.4	23.0	3.6
	12.0	3.5	8.2	1300	52.5	3.31	41.2	107.4	4.65	8.0	1300	51.1	33.0	0.65	2.11	58.3	24.2	3.0
				1500	53.6	3.20	42.7	103.1	4.91	7.4	1500	53.1	37.1	0.70	2.22	60.7	24.0	3.4
	6.0	1.0	2.2	1300	53.6	3.29	42.4	108.2	4.78	8.5	1300	49.7	33.1	0.66	2.56	58.5	19.4	4.4
				1500	54.7	3.17	43.9	103.8	5.05	7.9	1500	51.5	37.2	0.72	2.68	60.7	19.2	4.7
70	9.0	2.0	4.6	1300	56.1	3.40	44.5	110.0	4.84	8.8	1300	50.5	33.4	0.66	2.43	58.8	20.8	4.1
				1500	57.4	3.27	46.3	105.5	5.14	8.1	1500	52.3	37.5	0.72	2.54	61.0	20.6	4.5
	12.0	3.4	7.9	1300	57.6	3.44	45.8	111.0	4.91	9.0	1300	51.0	33.4	0.65	2.36	59.1	21.6	3.8
				1500	59.0	3.31	47.7	106.4	5.22	8.3	1500	52.9	37.5	0.71	2.47	61.3	21.4	4.2
	6.0	0.9	2.1	1300	57.1	3.37	45.6	110.7	4.97	9.6	1300	47.7	32.3	0.68	2.87	57.5	16.6	5.6
				1500	58.6	3.23	47.5	106.2	5.32	8.8	1500	49.3	36.3	0.74	2.99	59.5	16.5	5.9
80	9.0	1.9	4.5	1300	60.1	3.50	48.1	112.8	5.03	9.8	1300	48.5	32.7	0.67	2.71	57.8	17.9	5.2
				1500	61.7	3.35	50.3	108.1	5.40	9.1	1500	50.2	36.7	0.73	2.83	59.8	17.7	5.6
	12.0	3.3	7.6	1300	61.8	3.55	49.7	114.0	5.10	10.1	1300	49.0	32.7	0.67	2.64	58.0	18.6	4.8
				1500	63.5	3.39	51.9	109.2	5.49	9.4	1500	50.7	36.7	0.72	2.75	60.1	18.4	5.4
	6.0	0.9	2.1	1300	60.7	3.45	48.9	113.2	5.16	10.7	1300	44.5	30.8	0.69	3.20	55.4	13.9	7.0
				1500	62.4	3.29	51.2	108.5	5.56	9.9	1500	45.9	34.7	0.76	3.34	57.3	13.7	7.4
90	9.0	1.9	4.3	1300	64.1	3.61	51.7	115.6	5.20	11.1	1300	45.4	31.2	0.69	3.03	55.7	15.0	6.5
				1500	66.0	3.43	54.3	110.7	5.64	10.2	1500	46.8	35.0	0.75	3.15	57.6	14.8	7.1
	12.0	3.2	7.4	1300	66.1	3.67	53.5	117.0	5.27	11.4	1300	45.9	31.2	0.68	2.94	55.9	15.6	6.1
				1500	68.1	3.48	56.2	112.0	5.74	10.6	1500	47.3	35.0	0.74	3.06	57.7	15.4	6.7
	6.0	0.9	2.0								Operation not recommended							
100	9.0	1.8	4.2								1300	43.9	30.7	0.70	3.39	55.4	12.9	8.1
											1500	45.1	34.5	0.77	3.52	57.1	12.8	8.8
	12.0	3.1	7.1								1300	44.3	30.7	0.69	3.29	55.5	13.4	7.5
											1500	45.6	34.5	0.76	3.42	57.2	13.3	8.4
	6.0	0.8	1.9								Operation not recommended							
110	9.0	1.7	4.0	Operation not recommended							1300	39.7	28.5	0.72	3.78	52.5	10.5	9.9
											1500	40.7	32.0	0.79	3.91	54.0	10.4	10.8
	12.0	3.0	6.8								1300	40.1	28.5	0.71	3.67	52.6	10.9	9.2
											1500	41.1	32.0	0.78	3.80	54.0	10.8	10.2
	6.0	0.8	1.8								Operation not recommended							
120	9.0	1.7	3.8								1300	37.6	28.0	0.74	4.21	51.9	8.9	12.0
											1500	38.4	31.4	0.82	4.36	53.3	8.8	13.0
	12.0	2.8	6.6								1300	37.9	28.0	0.74	4.09	51.9	9.3	11.1
											1500	38.8	31.4	0.81	4.23	53.2	9.2	12.4

NS060 - Single Speed - ECM

Capacity Data (2000 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20				Operation not recommended							Operation not recommended							
	12.0	4.0	9.2															
	15.0	5.9	13.5	1500	37.9	3.66	25.4	93.4	3.03	6.5								
				2000	38.6	3.73	25.9	87.9	3.03	5.8								
30	9.0	2.4	5.5	Operation not recommended							Operation not recommended							
	12.0	3.9	8.9	1500	42.7	3.66	30.2	96.3	3.41	6.8	1500	73.6	46.9	0.64	2.16	81.0	34.1	---
				2000	43.5	3.73	30.8	90.1	3.42	6.2	2000	71.2	48.3	0.68	2.61	80.2	27.3	---
	15.0	5.7	13.1	1500	44.0	3.76	31.2	97.2	3.43	7.0	1500	74.3	47.0	0.63	2.16	81.7	34.4	---
				2000	44.9	3.83	31.8	90.8	3.44	6.4	2000	72.4	47.8	0.66	2.44	80.8	29.6	---
40	9.0	2.3	5.3	Operation not recommended							Operation not recommended							
	12.0	3.7	8.7	1500	50.3	3.82	37.3	101.1	3.86	7.5	1500	73.4	47.4	0.65	2.40	81.6	30.6	---
				2000	51.5	3.90	38.2	93.8	3.87	6.9	2000	72.7	49.5	0.68	2.81	82.3	25.9	---
	15.0	5.5	12.7	1500	51.7	3.91	38.4	101.9	3.88	7.8	1500	74.1	47.6	0.64	2.39	82.3	31.0	---
				2000	52.7	3.97	39.2	94.4	3.89	7.1	2000	73.6	49.3	0.67	2.65	82.6	27.7	---
50	9.0	2.2	5.2	1500	56.2	3.96	42.7	104.7	4.15	8.1	1500	73.6	48.4	0.66	2.81	83.2	26.2	3.9
				2000	56.8	4.01	43.1	96.3	4.15	7.5	2000	73.9	50.2	0.68	3.15	84.6	23.5	4.1
	12.0	3.6	8.4	1500	56.8	3.95	43.3	105.0	4.21	8.4	1500	73.8	48.5	0.66	2.71	83.0	27.2	3.6
				2000	58.3	4.05	44.4	97.0	4.21	7.7	2000	73.9	50.7	0.69	3.09	84.4	23.9	3.9
	15.0	5.3	12.3	1500	58.2	4.04	44.4	105.9	4.23	8.6	1500	74.5	48.7	0.65	2.70	83.7	27.6	3.4
				2000	59.3	4.09	45.3	97.5	4.25	7.9	2000	74.6	50.7	0.68	2.94	84.7	25.4	3.7
60	9.0	2.2	5.0	1500	62.1	4.10	48.1	108.3	4.44	9.1	1500	69.9	46.2	0.66	3.04	80.3	23.0	4.7
				2000	63.1	4.13	49.0	99.2	4.48	8.4	2000	71.5	49.1	0.69	3.33	82.9	21.4	5.0
	12.0	3.5	8.1	1500	63.6	4.11	49.5	109.3	4.53	9.4	1500	70.1	46.4	0.66	2.93	80.1	23.9	4.4
				2000	64.5	4.17	50.3	99.9	4.53	8.7	2000	71.8	49.3	0.69	3.24	82.9	22.2	4.8
	15.0	5.2	11.9	1500	65.0	4.19	50.7	110.1	4.55	9.7	1500	70.8	46.7	0.66	2.91	80.7	24.4	4.1
				2000	66.3	4.24	51.9	100.7	4.59	8.9	2000	72.2	49.6	0.69	3.12	82.8	23.2	4.6
70	9.0	2.1	4.9	1500	68.2	4.25	53.7	112.1	4.71	10.3	1500	67.2	45.2	0.67	3.42	78.9	19.7	5.9
				2000	69.6	4.27	55.1	102.2	4.78	9.5	2000	70.2	49.1	0.70	3.68	82.7	19.1	6.3
	12.0	3.4	7.9	1500	70.6	4.29	56.0	113.6	4.83	10.6	1500	67.5	45.5	0.67	3.29	78.7	20.5	5.5
				2000	70.9	4.31	56.2	102.8	4.82	9.8	2000	70.9	49.1	0.69	3.54	83.0	20.0	6.0
	15.0	5.0	11.6	1500	72.0	4.35	57.1	114.4	4.84	10.9	1500	68.2	45.8	0.67	3.25	79.3	21.0	5.1
				2000	73.6	4.40	58.6	104.1	4.90	10.0	2000	70.9	49.6	0.70	3.44	82.6	20.6	5.7
80	9.0	2.0	4.7	1500	72.9	4.36	58.0	115.0	4.90	11.5	1500	65.4	44.6	0.68	3.81	78.4	17.2	7.5
				2000	74.2	4.37	59.3	104.4	4.98	10.7	2000	67.1	47.7	0.71	4.06	80.9	16.5	8.0
	12.0	3.3	7.6	1500	76.2	4.44	61.0	117.0	5.03	11.9	1500	65.8	45.0	0.68	3.66	78.2	18.0	7.0
				2000	76.8	4.39	61.8	105.6	5.13	11.0	2000	67.8	47.7	0.70	3.87	81.0	17.5	7.6
	15.0	4.8	11.2	1500	77.4	4.49	62.0	117.8	5.05	12.2	1500	66.4	45.4	0.68	3.60	78.7	18.4	6.5
				2000	78.9	4.53	63.5	106.5	5.11	11.3	2000	68.1	48.2	0.71	3.76	80.9	18.1	7.2
90	9.0	2.0	4.5	1500	77.8	4.49	62.4	118.0	5.07	13.0	1500	62.1	43.2	0.70	4.20	76.4	14.8	9.4
				2000	79.0	4.49	63.7	106.6	5.16	12.0	2000	62.6	45.5	0.73	4.45	77.7	14.1	10.0
	12.0	3.2	7.3	1500	81.9	4.60	66.2	120.6	5.22	13.4	1500	62.6	43.7	0.70	4.03	76.3	15.5	8.8
				2000	82.9	4.49	67.6	108.4	5.41	12.4	2000	63.2	45.5	0.72	4.20	77.5	15.0	9.5
	15.0	4.7	10.8	1500	83.0	4.65	67.1	121.2	5.24	13.8	1500	63.2	44.1	0.70	3.96	76.7	16.0	8.2
				2000	84.5	4.68	68.5	109.1	5.30	12.8	2000	63.8	46.0	0.72	4.08	77.7	15.7	9.1
100	9.0	1.9	4.4								Operation not recommended							
	12.0	3.1	7.1								1500	60.1	42.9	0.71	4.59	75.7	13.1	10.9
											2000	60.7	44.7	0.74	4.70	76.7	12.9	11.8
	15.0	4.5	10.4								1500	60.7	43.4	0.72	4.49	76.0	13.5	10.1
											2000	61.3	45.2	0.74	4.58	76.9	13.4	11.2
110	9.0	1.8	4.2								Operation not recommended							
	12.0	2.9	6.8	Operation not recommended							1500	54.9	39.9	0.73	5.08	72.3	10.8	13.4
											2000	55.5	41.5	0.75	5.14	73.0	10.8	14.5
	15.0	4.3	10.0								1500	55.5	40.4	0.73	4.96	72.4	11.2	12.4
											2000	56.1	42.1	0.75	5.01	73.1	11.2	13.8
120	9.0	1.7	4.0								Operation not recommended							
	12.0	2.8	6.5								1500	52.9	40.5	0.77	5.78	72.6	9.1	16.1
											2000	51.8	41.2	0.80	5.80	71.6	8.9	17.5
	15.0	4.2	9.6								1500	53.4	41.1	0.77	5.62	72.6	9.5	15.0
											2000	52.7	41.7	0.79	5.63	71.9	9.4	16.7

NS070 - Single Speed - ECM

Capacity Data (2200 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20				Operation not recommended							Operation not recommended							
	15.0	4.4	10.2															
	18.0	6.0	13.9	1700	44.7	4.37	29.8	94.3	3.00	7.7								
				2200	45.7	4.46	30.5	89.2	3.01	6.9								
30	12.0	3.0	6.8	Operation not recommended							Operation not recommended							
	15.0	4.3	9.9	1700	51.5	4.47	36.2	98.0	3.38	8.1	1700	69.3	43.4	0.63	2.39	77.5	29.0	---
				2200	52.7	4.57	37.2	92.2	3.38	7.4	2200	73.9	49.6	0.67	2.79	83.4	26.5	---
	18.0	5.8	13.5	1700	51.7	4.49	36.4	98.2	3.38	8.4	1700	69.7	42.9	0.62	2.38	77.8	29.3	---
				2200	52.9	4.58	37.3	92.3	3.39	7.6	2200	74.3	49.0	0.66	2.78	83.8	26.7	---
40	12.0	2.9	6.6	Operation not recommended							Operation not recommended							
	15.0	4.1	9.6	1700	60.1	4.66	44.2	102.7	3.78	8.9	1700	73.1	46.1	0.63	2.63	82.1	27.8	---
				2200	61.5	4.72	45.5	95.9	3.82	8.2	2200	77.6	52.7	0.68	3.03	87.9	25.6	---
	18.0	5.7	13.1	1700	60.5	4.69	44.5	102.9	3.78	9.2	1700	73.7	45.9	0.62	2.61	82.6	28.2	---
				2200	62.0	4.74	45.8	96.1	3.83	8.4	2200	78.2	52.5	0.67	3.01	88.5	26.0	---
50	12.0	2.8	6.4	1700	66.2	4.81	49.8	106.1	4.04	9.7	1700	76.7	48.4	0.63	3.01	86.9	25.5	4.3
				2200	67.9	4.83	51.4	98.6	4.12	8.9	2200	81.0	55.4	0.68	3.43	92.7	23.6	4.5
	15.0	4.0	9.3	1700	67.6	4.85	51.0	106.8	4.08	10.0	1700	77.0	48.7	0.63	2.92	87.0	26.4	4.0
				2200	69.2	4.86	52.7	99.1	4.17	9.2	2200	81.4	55.7	0.68	3.33	92.8	24.5	4.3
	18.0	5.5	12.7	1700	68.2	4.89	51.5	107.1	4.09	10.3	1700	77.8	48.9	0.63	2.89	87.7	26.9	3.7
				2200	69.9	4.89	53.2	99.4	4.19	9.4	2200	82.3	55.9	0.68	3.29	93.5	25.0	4.1
60	12.0	2.7	6.2	1700	73.4	5.00	56.4	110.0	4.30	10.8	1700	73.7	46.9	0.64	3.31	85.0	22.3	5.2
				2200	75.3	4.97	58.3	101.7	4.44	10.0	2200	77.6	53.6	0.69	3.72	90.3	20.8	5.5
	15.0	3.9	9.0	1700	75.5	5.07	58.3	111.1	4.37	11.2	1700	74.1	47.0	0.63	3.22	85.0	23.0	4.8
				2200	77.5	5.03	60.3	102.6	4.52	10.3	2200	78.0	53.8	0.69	3.62	90.3	21.6	5.2
	18.0	5.3	12.3	1700	76.4	5.11	59.0	111.6	4.38	11.5	1700	75.0	47.6	0.64	3.17	85.8	23.6	4.5
				2200	78.4	5.06	61.2	103.0	4.54	10.6	2200	78.9	54.5	0.69	3.57	91.1	22.1	5.0
70	12.0	2.6	6.0	1700	81.0	5.21	63.2	114.1	4.56	12.2	1700	73.5	47.5	0.65	3.69	86.1	19.9	6.5
				2200	83.1	5.13	65.6	105.0	4.75	11.3	2200	77.1	54.4	0.71	4.11	91.1	18.8	6.9
	15.0	3.8	8.7	1700	83.9	5.30	65.8	115.7	4.64	12.6	1700	73.8	47.6	0.65	3.59	86.0	20.6	6.1
				2200	86.2	5.21	68.4	106.3	4.85	11.6	2200	77.4	54.5	0.70	3.99	91.0	19.4	6.6
	18.0	5.1	11.9	1700	85.1	5.35	66.8	116.3	4.66	13.0	1700	74.9	48.7	0.65	3.53	86.9	21.2	5.6
				2200	87.4	5.25	69.5	106.8	4.88	11.9	2200	78.5	55.7	0.71	3.93	91.9	20.0	6.3
80	12.0	2.5	5.8	1700	86.5	5.40	68.0	117.1	4.69	13.7	1700	70.5	45.5	0.65	4.12	84.5	17.1	8.2
				2200	88.9	5.27	70.9	107.4	4.94	12.7	2200	73.6	52.1	0.71	4.53	89.1	16.3	8.7
	15.0	3.6	8.4	1700	90.4	5.52	71.6	119.2	4.80	14.1	1700	70.7	45.5	0.64	4.00	84.4	17.7	7.7
				2200	93.0	5.38	74.6	109.1	5.07	13.1	2200	73.8	52.1	0.71	4.40	88.9	16.8	8.3
	18.0	5.0	11.5	1700	91.8	5.58	72.8	120.0	4.82	14.6	1700	71.9	46.9	0.65	3.92	85.3	18.3	7.1
				2200	94.6	5.42	76.1	109.8	5.11	13.5	2200	75.1	53.7	0.72	4.31	89.8	17.4	7.9
90	12.0	2.4	5.6	1700	92.4	5.62	73.2	120.3	4.82	15.4	1700	64.7	42.2	0.65	4.57	80.3	14.2	10.3
				2200	95.1	5.43	76.5	110.0	5.13	14.3	2200	67.3	48.4	0.72	4.98	84.3	13.5	10.9
	15.0	3.5	8.1	1700	97.3	5.76	77.6	123.0	4.95	15.9	1700	64.9	42.1	0.65	4.45	80.1	14.6	9.6
				2200	100.2	5.56	81.2	112.2	5.28	14.7	2200	67.5	48.3	0.72	4.84	84.0	13.9	10.4
	18.0	4.8	11.1	1700	99.0	5.83	79.1	123.9	4.98	16.4	1700	66.2	43.8	0.66	4.35	81.0	15.2	8.9
				2200	102.2	5.61	83.0	113.0	5.34	15.2	2200	68.8	50.3	0.73	4.73	85.0	14.6	9.9
100	12.0	2.3	5.4	Operation not recommended							Operation not recommended							
	15.0	3.4	7.8								1700	63.0	41.6	0.66	5.01	80.1	12.6	12.0
											2200	65.3	47.7	0.73	5.39	83.7	12.1	13.0
	18.0	4.6	10.7								1700	64.4	43.7	0.68	4.88	81.0	13.2	11.1
											2200	66.7	50.1	0.75	5.24	84.6	12.7	12.3
110	12.0	2.2	5.2								Operation not recommended							
	15.0	3.3	7.5	Operation not recommended							1700	55.9	37.0	0.66	5.58	74.9	10.0	14.6
											2200	57.7	42.4	0.74	5.94	77.9	9.7	15.9
	18.0	4.4	10.2								1700	57.3	39.1	0.68	5.41	75.7	10.6	13.6
											2200	59.1	44.9	0.76	5.76	78.8	10.3	15.1
120	12.0	2.2	5.0								Operation not recommended							
	15.0	3.1	7.2								1700	53.1	37.4	0.71	6.27	74.4	8.5	17.7
											2200	54.5	43.0	0.79	6.60	77.1	8.3	19.2
	18.0	4.3	9.8								1700	54.5	40.0	0.73	6.06	75.2	9.0	16.4
											2200	56.0	45.9	0.82	6.38	77.8	8.8	18.2

ND026 - Dual Capacity - ECM

Low Speed (700 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20				Operation not recommended							Operation not recommended							
	5.0	2.0	4.7															
	7.0	3.7	8.7	500	11.9	1.07	8.3	92.0	3.27	1.8								
				700	12.1	1.08	8.4	86.0	3.28	1.6								
	3.0	0.8	1.8	Operation not recommended							Operation not recommended							
30	5.0	2.0	4.5	500	13.7	1.08	10.0	95.3	3.71	1.8	500	22.0	14.6	0.66	0.54	23.9	40.7	---
				700	14.0	1.09	10.2	88.5	3.76	1.6	700	22.4	16.0	0.71	0.57	24.3	39.3	---
	7.0	3.6	8.4	500	14.0	1.09	10.2	95.8	3.76	1.8	500	22.2	14.6	0.66	0.52	23.9	42.2	---
				700	14.1	1.10	10.4	88.7	3.78	1.6	700	22.7	16.0	0.70	0.55	24.6	41.2	---
	3.0	0.8	1.8	Operation not recommended							Operation not recommended							
40	5.0	1.9	4.4	500	16.1	1.09	12.4	99.9	4.34	1.8	500	22.9	15.3	0.67	0.59	24.9	38.5	---
				700	16.4	1.09	12.7	91.8	4.41	1.7	700	23.3	16.6	0.71	0.62	25.4	37.4	---
	7.0	3.5	8.2	500	16.4	1.10	12.6	100.4	4.36	1.9	500	23.0	15.3	0.66	0.58	25.0	40.0	---
				700	16.7	1.10	13.0	92.1	4.44	1.7	700	23.6	16.6	0.71	0.60	25.6	39.1	---
	3.0	0.7	1.7	500	17.4	1.09	13.7	102.3	4.71	1.9	500	23.3	15.6	0.67	0.70	25.7	33.2	0.7
				700	17.8	1.09	14.1	93.5	4.80	1.7	700	23.8	17.1	0.72	0.73	26.3	32.6	0.8
50	5.0	1.8	4.3	500	18.3	1.11	14.5	103.9	4.84	1.9	500	23.5	15.8	0.67	0.67	25.8	35.3	0.7
				700	18.7	1.11	14.9	94.7	4.93	1.8	700	24.0	17.2	0.72	0.70	26.4	34.6	0.7
	7.0	3.4	7.9	500	18.6	1.13	14.7	104.4	4.84	2.0	500	23.8	15.8	0.66	0.65	26.0	36.8	0.6
				700	19.0	1.12	15.2	95.2	4.99	1.8	700	24.3	17.2	0.71	0.67	26.6	36.0	0.7
	3.0	0.7	1.7	500	19.7	1.10	16.0	106.5	5.23	2.1	500	22.6	15.4	0.68	0.79	25.3	28.5	1.0
				700	20.2	1.09	16.4	96.7	5.41	1.9	700	23.0	16.7	0.73	0.82	25.8	27.9	1.0
60	5.0	1.8	4.1	500	20.6	1.13	16.8	108.2	5.37	2.1	500	22.8	15.5	0.68	0.75	25.3	30.3	0.9
				700	21.2	1.12	17.4	98.0	5.54	2.0	700	23.3	16.9	0.73	0.78	25.9	29.7	1.0
	7.0	3.3	7.6	500	21.0	1.14	17.1	108.9	5.39	2.2	500	23.0	15.5	0.67	0.73	25.5	31.5	0.8
				700	21.5	1.13	17.7	98.5	5.60	2.0	700	23.5	16.9	0.72	0.76	26.0	31.0	0.9
	3.0	0.7	1.6	500	22.1	1.12	18.3	111.0	5.80	2.3	500	22.6	15.6	0.69	0.90	25.6	24.9	1.3
				700	22.7	1.10	18.9	100.0	6.05	2.1	700	23.0	16.9	0.74	0.94	26.2	24.5	1.4
70	5.0	1.7	4.0	500	23.1	1.14	19.2	112.8	5.94	2.4	500	22.7	15.7	0.69	0.85	25.7	26.6	1.3
				700	23.8	1.13	20.0	101.5	6.20	2.2	700	23.3	17.1	0.74	0.89	26.3	26.1	1.4
	7.0	3.2	7.4	500	23.5	1.15	19.6	113.6	5.97	2.4	500	23.0	15.7	0.68	0.83	25.8	27.6	1.2
				700	24.2	1.13	20.3	101.9	6.25	2.2	700	23.4	17.1	0.73	0.86	26.4	27.2	1.3
	3.0	0.7	1.6	500	24.0	1.15	20.1	114.5	6.13	2.6	500	21.3	15.0	0.71	1.03	24.8	20.6	1.8
				700	24.7	1.12	20.9	102.7	6.47	2.4	700	21.7	16.3	0.75	1.07	25.4	20.3	1.9
80	5.0	1.7	3.9	500	25.1	1.17	21.1	116.4	6.26	2.6	500	21.4	15.2	0.71	0.98	24.8	21.9	1.7
				700	25.9	1.15	22.0	104.3	6.63	2.4	700	21.9	16.5	0.75	1.01	25.4	21.7	1.9
	7.0	3.1	7.1	500	25.5	1.19	21.5	117.2	6.29	2.7	500	21.7	15.2	0.70	0.95	25.0	22.9	1.6
				700	26.3	1.16	22.4	104.8	6.68	2.5	700	22.1	16.5	0.75	0.98	25.5	22.5	1.8
	3.0	0.7	1.5	500	26.0	1.18	22.0	118.2	6.50	2.9	500	19.4	14.2	0.73	1.18	23.5	16.4	2.4
				700	26.9	1.14	23.0	105.6	6.92	2.7	700	19.9	15.4	0.77	1.22	24.0	16.3	2.6
90	5.0	1.6	3.7	500	27.2	1.20	23.1	120.3	6.62	3.0	500	19.6	14.4	0.73	1.12	23.4	17.5	2.3
				700	28.1	1.16	24.2	107.2	7.10	2.8	700	20.1	15.6	0.78	1.15	24.0	17.4	2.5
	7.0	3.0	6.9	500	27.6	1.22	23.5	121.1	6.65	3.1	500	19.9	14.4	0.72	1.08	23.6	18.4	2.1
				700	28.7	1.18	24.6	107.9	7.15	2.8	700	20.2	15.6	0.77	1.12	24.1	18.1	2.4
	3.0	0.6	1.5								Operation not recommended							
100	5.0	1.6	3.6								500	18.9	14.2	0.75	1.28	23.3	14.8	3.0
											700	19.3	15.4	0.80	1.32	23.8	14.7	3.2
	7.0	2.9	6.6								500	19.2	14.2	0.74	1.24	23.4	15.4	2.8
											700	19.5	15.4	0.79	1.28	23.9	15.2	3.1
	3.0	0.6	1.4								Operation not recommended							
110	5.0	1.5	3.4								500	16.6	13.1	0.79	1.45	21.6	11.4	3.8
											700	17.0	14.2	0.84	1.50	22.1	11.3	4.1
	7.0	2.8	6.4								500	16.8	13.1	0.78	1.41	21.6	11.9	3.5
											700	17.1	14.2	0.83	1.45	22.1	11.8	3.9
	3.0	0.6	1.3								Operation not recommended							
120	5.0	1.4	3.3								500	15.9	13.0	0.82	1.65	21.5	9.6	4.7
											700	16.2	14.1	0.87	1.70	22.0	9.5	5.1
	7.0	2.7	6.1								500	16.0	13.0	0.81	1.60	21.5	10.0	4.3
											700	16.4	14.1	0.86	1.65	22.0	9.9	4.8

ND026 - Dual Capacity - ECM

High Speed (900 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20				Operation not recommended							Operation not recommended							
	6.0	2.9	6.6															
	8.0	4.8	11.1	700	16.4	1.43	11.5	91.7	3.36	2.1								
				900	16.6	1.44	11.7	87.1	3.38	1.9								
30	4.0	1.4	3.2	Operation not recommended							Operation not recommended							
	6.0	2.8	6.4	700	18.8	1.47	13.8	94.9	3.75	2.3	700	29.2	19.3	0.66	0.96	32.5	30.3	---
				900	19.2	1.48	14.1	89.7	3.80	2.1	900	29.7	21.1	0.71	1.02	33.2	29.2	---
	8.0	4.7	10.8	700	19.2	1.48	14.1	95.4	3.80	2.3	700	29.4	19.3	0.66	0.94	32.6	31.4	---
				900	19.4	1.49	14.3	90.0	3.81	2.1	900	30.1	21.1	0.70	0.98	33.5	30.7	---
40	4.0	1.3	3.1	Operation not recommended							Operation not recommended							
	6.0	2.7	6.2	700	21.9	1.53	16.6	98.9	4.19	2.5	700	29.7	19.8	0.67	1.05	33.2	28.3	---
				900	22.3	1.53	17.1	92.9	4.26	2.3	900	30.2	21.6	0.72	1.10	34.0	27.5	---
	8.0	4.5	10.4	700	22.2	1.55	17.0	99.4	4.22	2.6	700	29.9	19.8	0.66	1.02	33.4	29.4	---
				900	22.7	1.55	17.4	93.3	4.30	2.4	900	30.5	21.6	0.71	1.06	34.2	28.7	---
50	4.0	1.3	3.0	700	23.6	1.57	18.3	101.2	4.42	2.7	700	29.4	20.0	0.68	1.22	33.6	24.1	1.3
				900	24.1	1.57	18.7	94.8	4.51	2.5	900	30.1	21.9	0.73	1.27	34.4	23.7	1.4
	6.0	2.6	6.0	700	24.8	1.60	19.3	102.8	4.54	2.8	700	29.7	20.3	0.68	1.16	33.7	25.6	1.3
				900	25.3	1.60	19.8	96.0	4.63	2.6	900	30.4	22.1	0.73	1.21	34.5	25.1	1.4
	8.0	4.4	10.1	700	25.1	1.62	19.6	103.3	4.54	2.9	700	30.1	20.3	0.67	1.12	33.9	26.7	1.2
				900	25.7	1.61	20.2	96.5	4.68	2.7	900	30.7	22.1	0.72	1.17	34.7	26.1	1.3
60	4.0	1.2	2.9	700	26.6	1.65	20.9	105.1	4.72	3.1	700	29.1	19.9	0.68	1.33	33.6	21.9	1.6
				900	27.1	1.63	21.6	97.9	4.88	2.9	900	29.7	21.7	0.73	1.38	34.4	21.5	1.7
	6.0	2.5	5.8	700	27.8	1.68	22.1	106.8	4.84	3.2	700	29.4	20.1	0.68	1.26	33.7	23.4	1.5
				900	28.5	1.67	22.8	99.3	5.00	2.9	900	30.0	21.9	0.73	1.31	34.5	22.9	1.6
	8.0	4.2	9.8	700	28.3	1.70	22.4	107.4	4.86	3.3	700	29.7	20.1	0.68	1.22	33.9	24.3	1.4
				900	29.0	1.68	23.2	99.8	5.05	3.0	900	30.3	21.9	0.72	1.27	34.6	23.9	1.6
70	4.0	1.2	2.8	700	29.6	1.74	23.7	109.2	5.00	3.5	700	28.7	19.9	0.69	1.48	33.8	19.5	2.0
				900	30.3	1.70	24.5	101.2	5.22	3.2	900	29.3	21.6	0.74	1.53	34.5	19.1	2.1
	6.0	2.4	5.6	700	30.9	1.77	24.9	110.9	5.12	3.6	700	29.0	20.0	0.69	1.39	33.7	20.8	1.9
				900	31.9	1.75	25.9	102.8	5.34	3.3	900	29.6	21.8	0.74	1.45	34.6	20.4	2.0
	8.0	4.1	9.5	700	31.5	1.79	25.4	111.7	5.15	3.7	700	29.3	20.0	0.68	1.36	34.0	21.6	1.7
				900	32.3	1.76	26.3	103.3	5.39	3.4	900	29.9	21.8	0.73	1.41	34.7	21.2	1.9
80	4.0	1.2	2.7	700	32.3	1.84	26.0	112.7	5.14	3.9	700	27.6	19.5	0.71	1.63	33.2	16.9	2.5
				900	33.3	1.80	27.1	104.2	5.43	3.6	900	28.2	21.1	0.75	1.69	34.0	16.7	2.7
	6.0	2.4	5.4	700	33.7	1.88	27.3	114.6	5.25	4.0	700	27.8	19.7	0.71	1.55	33.1	18.0	2.3
				900	34.8	1.84	28.6	105.8	5.56	3.7	900	28.5	21.4	0.75	1.60	33.9	17.8	2.5
	8.0	4.0	9.2	700	34.3	1.90	27.8	115.4	5.28	4.1	700	28.2	19.7	0.70	1.50	33.3	18.8	2.2
				900	35.4	1.85	29.1	106.4	5.60	3.8	900	28.7	21.4	0.75	1.55	34.0	18.5	2.4
90	4.0	1.1	2.6	700	35.1	1.95	28.5	116.5	5.27	4.3	700	26.1	18.8	0.72	1.81	32.3	14.5	3.1
				900	36.3	1.89	29.8	107.3	5.62	4.0	900	26.7	20.4	0.76	1.86	33.1	14.4	3.3
	6.0	2.3	5.2	700	36.6	2.00	29.8	118.5	5.37	4.5	700	26.4	19.1	0.72	1.71	32.2	15.4	2.9
				900	37.9	1.93	31.4	109.0	5.76	4.1	900	27.0	20.7	0.77	1.76	33.0	15.3	3.2
	8.0	3.8	8.8	700	37.2	2.02	30.3	119.3	5.39	4.6	700	26.7	19.1	0.71	1.65	32.4	16.2	2.7
				900	38.6	1.95	32.0	109.8	5.80	4.3	900	27.2	20.7	0.76	1.71	33.1	15.9	3.0
100	4.0	1.1	2.5	Operation not recommended							Operation not recommended							
	6.0	2.2	5.1								700	25.1	18.5	0.74	1.92	31.6	13.1	3.6
											900	25.6	20.1	0.78	1.97	32.3	13.0	3.9
	8.0	3.7	8.5								700	25.4	18.5	0.73	1.86	31.7	13.7	3.3
											900	25.8	20.1	0.78	1.92	32.4	13.5	3.7
110	4.0	1.0	2.4	Operation not recommended							Operation not recommended							
	6.0	2.1	4.9								700	23.0	17.4	0.76	2.12	30.2	10.8	4.4
											900	23.5	19.0	0.81	2.18	30.9	10.7	4.7
	8.0	3.5	8.2								700	23.2	17.4	0.75	2.06	30.2	11.3	4.1
											900	23.7	19.0	0.80	2.12	30.9	11.2	4.5
120	4.0	1.0	2.3								Operation not recommended							
	6.0	2.0	4.7								700	21.3	16.7	0.79	2.38	29.4	8.9	5.3
											900	21.6	18.2	0.84	2.44	30.0	8.9	5.7
	8.0	3.4	7.9								700	21.4	16.7	0.78	2.30	29.3	9.3	4.9
											900	21.9	18.2	0.83	2.37	30.0	9.2	5.4

ND038 - Dual Capacity - ECM

Low Speed (1050 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20				Operation not recommended							Operation not recommended							
	6.0	1.7	4.0															
	8.0	2.9	6.7	900	15.7	1.37	11.1	86.2	3.37	2.5								
				1050	16.4	1.40	11.6	84.5	3.42	2.3								
30	4.0	0.9	2.0	Operation not recommended							Operation not recommended							
	6.0	1.7	3.9	900	17.5	1.35	12.9	88.0	3.78	2.4	900	29.1	18.4	0.63	0.74	31.6	39.3	---
				1050	18.2	1.39	13.5	86.1	3.84	2.2	1050	29.9	20.4	0.68	0.75	32.5	39.6	---
	8.0	2.8	6.5	900	18.6	1.39	13.9	89.1	3.93	2.5	900	29.6	18.9	0.64	0.73	32.1	40.3	---
				1050	19.4	1.42	14.5	87.1	3.99	2.3	1050	30.4	20.9	0.69	0.75	33.0	40.6	---
40	4.0	0.8	1.9	Operation not recommended							Operation not recommended							
	6.0	1.6	3.8	900	20.6	1.38	15.9	91.2	4.39	2.5	900	30.3	19.7	0.65	0.80	33.0	37.8	---
				1050	21.4	1.41	16.6	88.8	4.45	2.3	1050	31.1	21.8	0.70	0.82	33.9	38.1	---
	8.0	2.7	6.3	900	21.8	1.41	16.9	92.4	4.51	2.6	900	30.8	20.2	0.66	0.79	33.5	38.8	---
				1050	22.5	1.44	17.6	89.8	4.58	2.4	1050	31.7	22.4	0.71	0.81	34.4	39.1	---
50	4.0	0.8	1.9	900	22.7	1.40	17.9	93.4	4.75	2.6	900	31.3	21.1	0.67	0.91	34.4	34.3	1.0
				1050	23.4	1.42	18.6	90.7	4.83	2.4	1050	32.2	23.4	0.73	0.93	35.3	34.6	1.1
	6.0	1.6	3.7	900	23.5	1.40	18.7	94.2	4.91	2.7	900	31.6	21.2	0.67	0.89	34.6	35.5	0.9
				1050	24.2	1.42	19.4	91.4	5.00	2.5	1050	32.5	23.5	0.72	0.91	35.6	35.8	1.0
	8.0	2.6	6.1	900	24.6	1.44	19.7	95.4	5.02	2.8	900	32.1	21.8	0.68	0.88	35.1	36.4	0.9
				1050	25.4	1.46	20.4	92.4	5.11	2.5	1050	33.0	24.1	0.73	0.90	36.1	36.7	1.0
60	4.0	0.8	1.8	900	25.6	1.43	20.8	96.4	5.25	2.9	900	30.1	20.3	0.68	1.02	33.5	29.5	1.3
				1050	26.3	1.44	21.4	93.2	5.34	2.6	1050	30.9	22.5	0.73	1.04	34.4	29.7	1.4
	6.0	1.5	3.6	900	26.7	1.43	21.8	97.4	5.47	3.0	900	30.3	20.5	0.67	0.99	33.7	30.5	1.3
				1050	27.3	1.44	22.4	94.1	5.57	2.7	1050	31.2	22.6	0.73	1.01	34.6	30.8	1.4
	8.0	2.5	5.9	900	27.6	1.46	22.6	98.4	5.54	3.0	900	30.8	21.0	0.68	0.98	34.2	31.3	1.2
				1050	28.2	1.47	23.2	94.9	5.64	2.8	1050	31.7	23.2	0.73	1.00	35.1	31.6	1.3
70	4.0	0.8	1.8	900	28.5	1.46	23.5	99.3	5.74	3.2	900	29.7	20.6	0.69	1.16	33.6	25.7	1.9
				1050	29.0	1.46	24.1	95.6	5.84	2.9	1050	30.5	22.8	0.75	1.18	34.5	25.9	2.0
	6.0	1.5	3.5	900	29.7	1.45	24.8	100.6	6.01	3.3	900	29.9	20.7	0.69	1.13	33.8	26.6	1.7
				1050	30.3	1.45	25.3	96.7	6.13	3.0	1050	30.8	23.0	0.75	1.15	34.7	26.8	1.9
	8.0	2.5	5.7	900	30.5	1.48	25.4	101.4	6.04	3.4	900	30.4	21.3	0.70	1.12	34.2	27.3	1.6
				1050	31.0	1.48	26.0	97.4	6.15	3.1	1050	31.3	23.5	0.75	1.14	35.2	27.5	1.8
80	4.0	0.7	1.7	900	31.2	1.48	26.1	102.1	6.16	3.6	900	28.6	20.2	0.71	1.32	33.1	21.7	2.5
				1050	31.6	1.47	26.6	97.9	6.28	3.3	1050	29.4	22.4	0.76	1.34	33.9	21.9	2.7
	6.0	1.4	3.3	900	32.7	1.47	27.6	103.6	6.50	3.7	900	28.8	20.3	0.71	1.28	33.2	22.5	2.4
				1050	33.0	1.46	28.1	99.1	6.63	3.4	1050	29.6	22.5	0.76	1.31	34.1	22.7	2.6
	8.0	2.4	5.5	900	33.1	1.50	28.0	104.1	6.46	3.8	900	29.3	20.8	0.71	1.27	33.6	23.0	2.2
				1050	33.5	1.49	28.4	99.5	6.58	3.5	1050	30.1	23.1	0.77	1.30	34.5	23.2	2.5
90	4.0	0.7	1.6	900	33.8	1.51	28.7	104.8	6.57	4.0	900	26.5	18.9	0.71	1.50	31.6	17.6	3.4
				1050	34.1	1.49	29.0	100.1	6.71	3.7	1050	27.2	20.9	0.77	1.53	32.4	17.8	3.6
	6.0	1.4	3.2	900	35.5	1.49	30.4	106.6	6.97	4.2	900	26.7	19.0	0.71	1.46	31.7	18.3	3.2
				1050	35.8	1.47	30.7	101.5	7.12	3.8	1050	27.4	21.0	0.77	1.49	32.5	18.4	3.4
	8.0	2.3	5.3	900	35.7	1.52	30.5	106.7	6.87	4.3	900	27.1	19.5	0.72	1.45	32.1	18.7	2.9
				1050	35.9	1.50	30.7	101.6	7.01	4.0	1050	27.9	21.6	0.77	1.48	32.9	18.9	3.3
100	4.0	0.7	1.6	Operation not recommended							Operation not recommended							
	6.0	1.3	3.1								900	25.8	19.3	0.75	1.67	31.5	15.4	4.1
											1050	26.5	21.4	0.81	1.70	32.3	15.6	4.5
	8.0	2.2	5.1								900	26.2	19.8	0.76	1.65	31.8	15.8	3.8
											1050	26.9	21.9	0.81	1.69	32.7	16.0	4.2
110	4.0	0.7	1.5								Operation not recommended							
	6.0	1.3	3.0	Operation not recommended							900	23.1	18.1	0.79	1.90	29.6	12.2	5.2
											1050	23.7	20.1	0.85	1.93	30.3	12.3	5.7
	8.0	2.1	4.9								900	23.5	18.6	0.79	1.88	29.9	12.5	4.8
											1050	24.1	20.6	0.85	1.92	30.7	12.6	5.4
120	4.0	0.6	1.5								Operation not recommended							
	6.0	1.2	2.9								900	21.9	18.0	0.82	2.15	29.2	10.2	6.5
											1050	22.5	19.9	0.88	2.20	30.0	10.2	7.0
	8.0	2.0	4.7								900	22.2	18.4	0.83	2.13	29.5	10.4	6.0
											1050	22.9	20.4	0.89	2.18	30.3	10.5	6.7

ND038 - Dual Capacity - ECM

High Speed (1250 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20				Operation not recommended							Operation not recommended							
	7.0	2.3	5.2															
	9.0	3.5	8.1	1050	22.5	1.94	15.9	89.8	3.41	2.9								
				1250	23.2	1.99	16.4	87.2	3.41	2.6								
30	5.0	1.2	2.9	Operation not recommended							Operation not recommended							
	7.0	2.2	5.1	1050	25.9	1.97	19.2	92.8	3.85	3.1	1050	37.9	22.5	0.59	1.41	42.8	27.0	---
				1250	26.6	2.03	19.7	89.7	3.84	2.8	1250	40.1	25.1	0.63	1.49	45.2	26.9	---
	9.0	3.4	7.9	1050	26.3	1.99	19.5	93.2	3.87	3.2	1050	38.2	24.8	0.65	1.37	42.9	28.0	---
				1250	27.2	2.05	20.2	90.1	3.88	2.9	1250	40.5	27.5	0.68	1.46	45.5	27.8	---
40	5.0	1.2	2.8	Operation not recommended							Operation not recommended							
	7.0	2.1	4.9	1050	30.2	2.09	23.1	96.7	4.24	3.4	1050	39.4	24.1	0.61	1.55	44.7	25.4	---
				1250	31.2	2.13	23.9	93.1	4.28	3.1	1250	41.5	26.8	0.65	1.64	47.1	25.4	---
	9.0	3.3	7.6	1050	30.8	2.11	23.6	97.2	4.29	3.5	1050	39.7	26.1	0.66	1.51	44.9	26.3	---
				1250	31.8	2.15	24.5	93.6	4.33	3.2	1250	42.0	29.0	0.69	1.60	47.4	26.2	---
50	5.0	1.2	2.7	1050	32.8	2.14	25.5	98.9	4.48	3.7	1050	39.6	25.1	0.63	1.84	45.9	21.5	1.9
				1250	33.7	2.17	26.3	95.0	4.56	3.4	1250	41.7	27.9	0.67	1.94	48.3	21.5	2.0
	7.0	2.1	4.8	1050	34.0	2.19	26.5	99.9	4.54	3.8	1050	40.5	25.4	0.63	1.74	46.4	23.3	1.8
				1250	35.0	2.22	27.5	96.0	4.63	3.5	1250	42.6	28.2	0.66	1.82	48.8	23.4	1.9
	9.0	3.2	7.4	1050	34.7	2.21	27.2	100.6	4.60	3.9	1050	40.9	27.1	0.66	1.69	46.7	24.1	1.7
				1250	35.8	2.24	28.2	96.5	4.69	3.6	1250	43.1	30.1	0.70	1.78	49.1	24.2	1.8
60	5.0	1.1	2.6	1050	36.1	2.25	28.5	101.9	4.71	4.2	1050	39.2	25.7	0.66	1.96	45.9	20.0	2.3
				1250	37.3	2.26	29.6	97.6	4.83	3.8	1250	41.1	28.6	0.70	2.05	48.1	20.1	2.4
	7.0	2.0	4.6	1050	37.8	2.31	29.9	103.3	4.79	4.3	1050	40.2	26.0	0.65	1.87	46.5	21.5	2.2
				1250	39.0	2.33	31.0	98.9	4.91	4.0	1250	42.1	28.9	0.69	1.94	48.7	21.6	2.3
	9.0	3.1	7.2	1050	38.7	2.33	30.7	104.1	4.85	4.4	1050	40.5	27.4	0.68	1.82	46.8	22.3	2.0
				1250	39.9	2.34	31.9	99.6	4.99	4.1	1250	42.5	30.4	0.71	1.90	49.0	22.4	2.2
70	5.0	1.1	2.5	1050	39.6	2.37	31.5	104.9	4.90	4.7	1050	39.2	26.6	0.68	2.15	46.5	18.2	2.9
				1250	40.9	2.37	32.8	100.3	5.07	4.3	1250	40.9	29.6	0.72	2.24	48.5	18.3	3.0
	7.0	1.9	4.5	1050	41.6	2.45	33.3	106.7	4.99	4.8	1050	40.2	26.9	0.67	2.06	47.2	19.5	2.7
				1250	43.0	2.45	34.6	101.8	5.15	4.4	1250	41.9	29.8	0.71	2.13	49.2	19.6	2.9
	9.0	3.0	6.9	1050	42.7	2.47	34.2	107.6	5.05	5.0	1050	40.6	28.0	0.69	2.01	47.5	20.2	2.5
				1250	44.1	2.47	35.7	102.7	5.25	4.6	1250	42.4	31.0	0.73	2.09	49.6	20.3	2.8
80	5.0	1.1	2.5	1050	42.1	2.46	33.7	107.1	5.01	5.2	1050	37.8	26.2	0.69	2.34	45.8	16.1	3.6
				1250	43.6	2.44	35.2	102.3	5.22	4.8	1250	39.3	29.2	0.74	2.42	47.5	16.3	3.8
	7.0	1.9	4.3	1050	44.5	2.56	35.8	109.3	5.09	5.4	1050	38.8	26.6	0.68	2.26	46.6	17.2	3.3
				1250	46.0	2.54	37.4	104.1	5.32	5.0	1250	40.4	29.4	0.73	2.33	48.3	17.4	3.6
	9.0	2.9	6.7	1050	45.8	2.60	37.0	110.4	5.17	5.6	1050	39.3	27.2	0.69	2.21	46.8	17.7	3.1
				1250	47.4	2.56	38.7	105.1	5.43	5.1	1250	40.9	30.1	0.74	2.28	48.7	17.9	3.4
90	5.0	1.0	2.4	1050	44.7	2.58	35.9	109.4	5.08	5.9	1050	35.7	25.5	0.71	2.53	44.3	14.1	4.4
				1250	46.3	2.54	37.6	104.3	5.34	5.4	1250	37.0	28.4	0.77	2.59	45.8	14.3	4.7
	7.0	1.8	4.2	1050	47.5	2.69	38.3	111.9	5.17	6.0	1050	36.8	25.9	0.70	2.46	45.1	15.0	4.1
				1250	49.2	2.64	40.2	106.4	5.45	5.6	1250	38.1	28.7	0.75	2.52	46.7	15.1	4.5
	9.0	2.8	6.5	1050	49.0	2.73	39.7	113.2	5.26	6.2	1050	37.2	26.1	0.70	2.42	45.4	15.4	3.9
				1250	50.7	2.66	41.6	107.5	5.58	5.8	1250	38.6	28.9	0.75	2.47	47.0	15.6	4.3
100	5.0	1.0	2.3								Operation not recommended							
	7.0	1.7	4.0								1050	35.4	25.6	0.72	2.74	44.8	12.9	5.1
											1250	36.6	28.4	0.78	2.78	46.1	13.1	5.5
	9.0	2.7	6.2								1050	35.8	25.6	0.71	2.69	45.0	13.3	4.8
											1250	37.0	28.3	0.76	2.74	46.3	13.5	5.3
110	5.0	1.0	2.2								Operation not recommended							
	7.0	1.7	3.9	Operation not recommended							1050	32.4	24.1	0.74	2.99	42.6	10.8	6.2
											1250	33.3	26.7	0.80	3.01	43.6	11.0	6.8
	9.0	2.6	6.0								1050	32.7	23.7	0.73	2.94	42.8	11.1	5.8
											1250	33.6	26.2	0.78	2.97	43.8	11.3	6.4
120	5.0	0.9	2.1								Operation not recommended							
	7.0	1.6	3.7								1050	30.5	23.6	0.77	3.34	41.9	9.1	7.5
											1250	31.2	26.2	0.84	3.34	42.6	9.3	8.1
	9.0	2.5	5.8								1050	30.8	23.0	0.75	3.29	42.0	9.4	7.0
											1250	31.5	25.3	0.81	3.30	42.7	9.5	7.7

ND049 - Dual Capacity - ECM

Low Speed (1350 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20				Operation not recommended							Operation not recommended							
	8.0	2.0	4.6															
	11.0	3.4	7.8	1150	22.5	2.05	15.5	88.1	3.22	4.2								
				1350	23.3	2.08	16.2	86.0	3.29	3.8								
30	5.0	0.9	2.1	Operation not recommended							Operation not recommended							
	8.0	1.9	4.4	1150	25.9	2.09	18.8	90.9	3.64	4.3	1150	36.1	21.1	0.59	1.19	40.1	30.2	---
				1350	26.7	2.10	19.6	88.3	3.72	3.9	1350	37.3	24.9	0.67	1.27	41.7	29.5	---
	11.0	3.3	7.6	1150	26.6	2.10	19.4	91.4	3.70	4.4	1150	36.1	21.1	0.58	1.11	39.9	32.5	---
				1350	27.5	2.13	20.3	88.9	3.78	4.0	1350	37.1	24.9	0.67	1.18	41.1	31.4	---
40	5.0	0.9	2.0	Operation not recommended							Operation not recommended							
	8.0	1.9	4.3	1150	29.8	2.16	22.4	94.0	4.03	4.5	1150	38.1	23.1	0.61	1.31	42.6	29.0	---
				1350	30.8	2.16	23.4	91.1	4.17	4.2	1350	39.4	27.2	0.69	1.39	44.1	28.4	---
	11.0	3.2	7.4	1150	30.8	2.18	23.3	94.8	4.14	4.7	1150	38.3	23.1	0.60	1.23	42.5	31.0	---
				1350	31.8	2.19	24.3	91.8	4.25	4.2	1350	39.4	27.2	0.69	1.30	43.8	30.3	---
50	5.0	0.9	2.0	1150	30.8	2.16	23.5	94.8	4.19	4.8	1150	38.9	24.7	0.64	1.70	44.6	22.9	1.6
				1350	31.8	2.16	24.5	91.8	4.32	4.4	1350	40.1	29.1	0.73	1.77	46.1	22.7	1.7
	8.0	1.8	4.2	1150	33.2	2.23	25.6	96.8	4.37	4.9	1150	39.7	24.8	0.62	1.47	44.7	27.0	1.5
				1350	34.5	2.21	27.0	93.7	4.57	4.5	1350	40.9	29.2	0.71	1.54	46.2	26.6	1.6
	11.0	3.1	7.2	1150	34.5	2.24	26.9	97.8	4.51	5.1	1150	39.9	24.8	0.62	1.38	44.7	28.9	1.4
				1350	35.7	2.24	28.0	94.5	4.66	4.6	1350	41.2	29.2	0.71	1.45	46.1	28.3	1.5
60	5.0	0.8	1.9	1150	33.7	2.24	26.1	97.1	4.41	5.2	1150	38.7	24.6	0.64	1.83	44.9	21.2	2.3
				1350	34.9	2.23	27.3	94.0	4.60	4.8	1350	39.9	29.0	0.73	1.91	46.4	20.9	2.4
	8.0	1.8	4.0	1150	36.5	2.30	28.6	99.4	4.65	5.4	1150	39.3	24.8	0.63	1.62	44.8	24.2	2.1
				1350	37.9	2.27	30.1	96.0	4.89	5.0	1350	40.5	29.2	0.72	1.70	46.3	23.9	2.3
	11.0	3.0	6.9	1150	38.0	2.32	30.1	100.6	4.81	5.5	1150	39.8	24.9	0.63	1.54	45.0	25.8	1.9
				1350	39.4	2.29	31.6	97.0	5.04	5.1	1350	41.0	29.3	0.72	1.61	46.4	25.5	2.2
70	5.0	0.8	1.8	1150	36.4	2.32	28.5	99.3	4.61	5.8	1150	38.9	25.9	0.67	2.01	45.7	19.3	3.2
				1350	37.9	2.29	30.0	96.0	4.84	5.4	1350	40.1	30.5	0.76	2.11	47.3	19.0	3.4
	8.0	1.7	3.9	1150	39.6	2.36	31.5	101.8	4.91	6.0	1150	39.3	26.2	0.67	1.82	45.5	21.5	3.0
				1350	41.1	2.32	33.2	98.2	5.19	5.5	1350	40.5	30.7	0.76	1.90	47.0	21.3	3.2
	11.0	2.9	6.7	1150	41.4	2.39	33.2	103.3	5.08	6.1	1150	40.0	26.3	0.66	1.74	45.9	22.9	2.8
				1350	42.9	2.33	35.0	99.4	5.39	5.7	1350	41.2	30.9	0.75	1.81	47.4	22.8	3.1
80	5.0	0.8	1.8	1150	38.7	2.38	30.6	101.2	4.77	6.5	1150	37.6	24.8	0.66	2.20	45.1	17.1	4.4
				1350	40.2	2.34	32.2	97.6	5.05	6.0	1350	38.8	29.2	0.75	2.29	46.7	17.0	4.6
	8.0	1.6	3.8	1150	42.0	2.40	33.8	103.8	5.13	6.7	1150	37.9	25.1	0.66	2.04	44.8	18.6	4.1
				1350	43.7	2.34	35.7	100.0	5.47	6.1	1350	39.0	29.5	0.76	2.12	46.2	18.4	4.4
	11.0	2.8	6.5	1150	44.2	2.43	35.9	105.6	5.33	6.9	1150	38.7	25.3	0.65	1.95	45.4	19.8	3.8
				1350	45.9	2.36	37.9	101.5	5.70	6.3	1350	39.9	29.7	0.74	2.03	46.8	19.6	4.2
90	5.0	0.7	1.7	1150	40.8	2.43	32.5	102.9	4.93	7.2	1150	35.5	22.8	0.64	2.40	43.7	14.8	5.9
				1350	42.4	2.38	34.3	99.1	5.23	6.7	1350	36.6	26.8	0.73	2.50	45.2	14.7	6.2
	8.0	1.6	3.6	1150	44.4	2.44	36.1	105.7	5.33	7.4	1150	35.5	23.1	0.65	2.28	43.3	15.6	5.5
				1350	46.2	2.36	38.2	101.7	5.73	6.9	1350	36.5	27.2	0.75	2.36	44.5	15.5	5.9
	11.0	2.7	6.2	1150	46.8	2.47	38.4	107.7	5.56	7.7	1150	36.5	23.4	0.64	2.18	43.9	16.7	5.1
				1350	48.8	2.39	40.6	103.5	5.99	7.1	1350	37.6	27.5	0.73	2.28	45.4	16.5	5.6
100	5.0	0.7	1.7	Operation not recommended							Operation not recommended							
	8.0	1.5	3.5								1150	33.9	23.8	0.70	2.56	42.6	13.2	7.1
											1350	34.9	28.0	0.80	2.66	44.0	13.1	7.7
	11.0	2.6	6.0								1150	35.1	24.2	0.69	2.47	43.5	14.2	6.6
											1350	36.1	28.4	0.79	2.57	44.9	14.1	7.3
110	5.0	0.7	1.6								Operation not recommended							
	8.0	1.5	3.4	Operation not recommended							1150	30.4	22.4	0.74	2.85	40.1	10.7	9.0
											1350	31.4	26.4	0.84	2.97	41.5	10.6	9.8
	11.0	2.5	5.8								1150	31.8	22.8	0.72	2.76	41.2	11.5	8.4
											1350	32.7	26.8	0.82	2.88	42.5	11.4	9.3
120	5.0	0.7	1.5								Operation not recommended							
	8.0	1.4	3.3								1150	28.0	21.8	0.78	3.18	38.9	8.8	11.2
											1350	29.0	25.6	0.89	3.32	40.3	8.7	12.1
	11.0	2.4	5.6								1150	29.6	22.2	0.75	3.09	40.2	9.6	10.4
											1350	30.4	26.1	0.86	3.24	41.4	9.4	11.5

ND049 - Dual Capacity - ECM

High Speed (1550 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20				Operation not recommended							Operation not recommended							
	9.0	2.5	5.7															
	12.0	4.0	9.2	1350	31.3	2.72	22.1	91.5	3.38	5.3								
				1550	32.4	2.80	22.8	89.3	3.38	4.8								
30	6.0	1.2	2.9	Operation not recommended							Operation not recommended							
	9.0	2.4	5.5	1350	35.8	2.85	26.1	94.5	3.68	5.6	1350	47.7	29.4	0.62	1.90	54.2	25.1	---
				1550	36.9	2.94	26.8	92.0	3.68	5.2	1550	50.6	32.7	0.65	2.02	57.5	25.0	---
	12.0	3.9	8.9	1350	36.3	2.88	26.5	94.9	3.70	5.8	1350	48.2	29.4	0.61	1.81	54.4	26.7	---
				1550	37.5	2.97	27.4	92.4	3.71	5.3	1550	51.0	32.6	0.64	1.93	57.6	26.4	---
40	6.0	1.2	2.8	Operation not recommended							Operation not recommended							
	9.0	2.3	5.3	1350	40.8	2.97	30.6	98.0	4.02	6.2	1350	49.5	31.1	0.63	2.10	56.7	23.6	---
				1550	42.0	3.04	31.6	95.1	4.04	5.7	1550	52.3	34.6	0.66	2.22	59.9	23.5	---
	12.0	3.7	8.7	1350	41.5	3.01	31.2	98.5	4.04	6.4	1350	50.0	31.1	0.62	2.01	56.9	24.9	---
				1550	42.9	3.07	32.4	95.6	4.09	5.8	1550	52.8	34.6	0.66	2.13	60.0	24.8	---
50	6.0	1.2	2.7	1350	43.6	3.08	33.1	99.9	4.15	6.7	1350	50.1	31.9	0.64	2.50	58.6	20.0	3.0
				1550	45.0	3.12	34.4	96.9	4.23	6.2	1550	52.7	35.4	0.67	2.64	61.7	20.0	3.2
	9.0	2.2	5.2	1350	45.3	3.14	34.6	101.1	4.23	6.9	1350	50.7	32.4	0.64	2.35	58.7	21.6	2.8
				1550	46.6	3.19	35.8	97.9	4.29	6.4	1550	53.4	36.0	0.67	2.47	61.8	21.7	3.0
	12.0	3.6	8.4	1350	46.2	3.18	35.4	101.7	4.27	7.2	1350	51.2	32.5	0.63	2.26	58.9	22.7	2.6
				1550	47.8	3.22	36.8	98.5	4.35	6.5	1550	53.8	36.1	0.67	2.38	62.0	22.7	2.9
60	6.0	1.1	2.6	1350	47.6	3.21	36.7	102.7	4.35	7.6	1350	49.5	32.2	0.65	2.66	58.6	18.6	3.7
				1550	49.1	3.22	38.1	99.3	4.47	7.0	1550	51.9	35.8	0.69	2.78	61.4	18.7	3.9
	9.0	2.2	5.0	1350	49.8	3.29	38.6	104.1	4.44	7.8	1350	50.3	32.7	0.65	2.51	58.9	20.0	3.4
				1550	51.3	3.30	40.0	100.6	4.55	7.2	1550	52.8	36.3	0.69	2.62	61.7	20.1	3.7
	12.0	3.5	8.1	1350	50.9	3.33	39.6	104.9	4.49	8.0	1350	50.9	32.8	0.65	2.43	59.2	20.9	3.2
				1550	52.6	3.34	41.2	101.4	4.62	7.4	1550	53.3	36.5	0.68	2.54	62.0	21.0	3.5
70	6.0	1.1	2.5	1350	51.5	3.32	40.2	105.4	4.55	8.5	1350	49.2	32.8	0.67	2.91	59.1	16.9	4.6
				1550	53.1	3.31	41.8	101.7	4.70	7.9	1550	51.4	36.5	0.71	3.02	61.7	17.0	4.9
	9.0	2.1	4.9	1350	54.1	3.42	42.4	107.1	4.63	8.8	1350	50.3	33.3	0.66	2.77	59.8	18.2	4.3
				1550	55.8	3.41	44.1	103.3	4.79	8.1	1550	52.5	36.9	0.70	2.87	62.3	18.3	4.6
	12.0	3.4	7.9	1350	55.5	3.47	43.7	108.1	4.69	9.0	1350	50.8	33.5	0.66	2.69	60.0	18.9	4.0
				1550	57.3	3.45	45.5	104.2	4.87	8.3	1550	53.1	37.2	0.70	2.80	62.7	19.0	4.4
80	6.0	1.1	2.5	1350	54.7	3.49	42.7	107.5	4.58	9.6	1350	47.2	32.1	0.68	3.15	57.9	15.0	5.8
				1550	56.4	3.45	44.7	103.7	4.79	8.8	1550	49.1	35.6	0.73	3.24	60.2	15.1	6.2
	9.0	2.0	4.7	1350	57.7	3.62	45.4	109.6	4.67	9.8	1350	48.4	32.5	0.67	3.03	58.7	16.0	5.4
				1550	59.6	3.58	47.4	105.6	4.88	9.1	1550	50.4	36.0	0.71	3.12	61.0	16.2	5.9
	12.0	3.3	7.6	1350	59.4	3.66	46.9	110.7	4.75	10.1	1350	48.9	32.7	0.67	2.96	59.0	16.5	5.0
				1550	61.3	3.62	49.0	106.6	4.97	9.4	1550	50.9	36.3	0.71	3.05	61.3	16.7	5.6
90	6.0	1.0	2.4	1350	57.7	3.66	45.2	109.6	4.62	10.7	1350	44.3	30.8	0.70	3.39	55.9	13.1	7.3
				1550	59.7	3.58	47.4	105.6	4.88	9.9	1550	46.0	34.2	0.74	3.46	57.8	13.3	7.7
	9.0	2.0	4.5	1350	61.3	3.81	48.3	112.0	4.71	11.1	1350	45.7	31.1	0.68	3.29	56.9	13.9	6.8
				1550	63.3	3.73	50.6	107.8	4.98	10.2	1550	47.4	34.5	0.73	3.36	58.8	14.1	7.4
	12.0	3.2	7.3	1350	63.1	3.85	50.0	113.3	4.81	11.4	1350	46.2	31.4	0.68	3.22	57.2	14.3	6.3
				1550	65.3	3.78	52.4	109.0	5.07	10.6	1550	47.8	34.9	0.73	3.29	59.0	14.5	7.0
100	6.0	1.0	2.3								Operation not recommended							
	9.0	1.9	4.4								1350	43.6	30.5	0.70	3.66	56.0	11.9	8.4
											1550	45.0	33.7	0.75	3.71	57.7	12.2	9.2
	12.0	3.1	7.1								1350	44.0	30.8	0.70	3.60	56.3	12.2	7.8
											1550	45.4	34.2	0.75	3.65	57.9	12.5	8.7
110	6.0	1.0	2.2								Operation not recommended							
	9.0	1.8	4.2	Operation not recommended							1350	39.4	28.4	0.72	3.97	52.9	9.9	10.3
											1550	40.5	31.4	0.78	4.00	54.1	10.1	11.2
	12.0	2.9	6.8								1350	39.8	28.8	0.72	3.92	53.2	10.1	9.6
											1550	40.9	31.9	0.78	3.95	54.4	10.3	10.7
120	6.0	0.9	2.1								Operation not recommended							
	9.0	1.7	4.0								1350	36.5	27.2	0.74	4.42	51.6	8.3	12.5
											1550	37.4	30.1	0.80	4.42	52.5	8.5	13.5
	12.0	2.8	6.5								1350	36.9	27.7	0.75	4.38	51.9	8.4	11.6
											1550	37.8	30.6	0.81	4.38	52.7	8.6	12.9

ND064 - Dual Capacity - ECM

Low Speed (1500 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20				Operation not recommended							Operation not recommended							
	10.0	2.7	6.2															
	14.0	5.1	11.8	1250	26.2	2.55	17.5	89.4	3.01	4.9								
				1500	27.1	2.59	18.3	86.7	3.07	4.5								
30	6.0	1.0	2.3	Operation not recommended							Operation not recommended							
	10.0	2.6	6.0	1250	30.4	2.63	21.4	92.5	3.39	5.0	1250	51.7	30.4	0.59	1.43	56.5	36.0	1.3
				1500	31.5	2.67	22.4	89.4	3.46	4.6	1500	53.2	34.6	0.65	1.50	58.3	35.5	1.4
	14.0	5.0	11.5	1250	31.5	2.63	22.5	93.3	3.51	5.1	1250	51.8	30.3	0.59	1.40	56.6	37.0	1.2
				1500	32.6	2.67	23.5	90.1	3.58	4.7	1500	53.1	34.5	0.65	1.48	58.1	36.0	1.3
40	6.0	1.0	2.3	Operation not recommended							Operation not recommended							
	10.0	2.5	5.9	1250	35.9	2.72	26.6	96.6	3.86	5.3	1250	53.2	31.1	0.59	1.57	58.5	33.8	1.4
				1500	36.9	2.73	27.6	92.8	3.96	4.9	1500	54.8	35.4	0.65	1.65	60.4	33.2	1.6
	14.0	4.8	11.1	1250	37.1	2.73	27.7	97.5	3.98	5.5	1250	53.3	31.1	0.58	1.54	58.6	34.7	1.3
				1500	38.1	2.74	28.7	93.5	4.07	5.0	1500	54.8	35.3	0.65	1.62	60.3	33.8	1.5
50	6.0	0.9	2.2	1250	40.4	2.76	31.0	99.9	4.28	5.6	1250	54.5	31.5	0.58	1.82	60.7	29.9	2.0
				1500	41.5	2.76	32.1	95.6	4.40	5.2	1500	56.1	35.8	0.64	1.92	62.6	29.1	2.1
	10.0	2.5	5.7	1250	41.0	2.82	31.4	100.4	4.27	5.7	1250	54.6	31.8	0.58	1.76	60.6	31.1	1.9
				1500	42.0	2.80	32.4	95.9	4.39	5.3	1500	56.2	36.1	0.64	1.84	62.5	30.5	2.0
	14.0	4.7	10.8	1250	42.3	2.83	32.6	101.3	4.37	5.9	1250	54.7	31.8	0.58	1.72	60.6	31.8	1.7
				1500	43.2	2.82	33.6	96.7	4.50	5.4	1500	56.3	36.1	0.64	1.81	62.5	31.2	1.9
60	6.0	0.9	2.1	1250	45.0	2.86	35.2	103.3	4.61	6.1	1250	52.5	30.9	0.59	2.04	59.4	25.8	2.8
				1500	45.9	2.83	36.3	98.3	4.75	5.7	1500	54.1	34.8	0.64	2.13	61.4	25.4	3.0
	10.0	2.4	5.5	1250	46.4	2.91	36.4	104.3	4.67	6.3	1250	52.7	31.1	0.59	1.97	59.5	26.8	2.6
				1500	47.1	2.87	37.3	99.1	4.82	5.8	1500	54.3	35.2	0.65	2.06	61.3	26.4	2.9
	14.0	4.5	10.4	1250	47.5	2.93	37.5	105.2	4.74	6.5	1250	53.0	31.2	0.59	1.93	59.5	27.4	2.5
				1500	48.2	2.89	38.3	99.8	4.89	6.0	1500	54.5	35.2	0.65	2.02	61.4	27.0	2.7
70	6.0	0.9	2.0	1250	49.4	2.95	39.3	106.6	4.91	6.8	1250	51.6	31.2	0.61	2.30	59.4	22.4	4.0
				1500	50.2	2.90	40.4	101.0	5.08	6.3	1500	53.2	35.0	0.66	2.40	61.4	22.2	4.2
	10.0	2.3	5.3	1250	51.5	3.00	41.3	108.1	5.04	7.0	1250	51.9	31.5	0.61	2.23	59.5	23.2	3.7
				1500	52.1	2.93	42.1	102.1	5.21	6.5	1500	53.5	35.4	0.66	2.33	61.5	23.0	4.0
	14.0	4.4	10.1	1250	52.5	3.03	42.1	108.9	5.08	7.2	1250	52.2	31.6	0.61	2.19	59.7	23.9	3.5
				1500	53.0	2.96	42.9	102.7	5.25	6.6	1500	53.8	35.6	0.66	2.28	61.6	23.6	3.9
80	6.0	0.9	2.0	1250	53.6	3.04	43.2	109.7	5.17	7.6	1250	49.3	30.1	0.61	2.60	58.2	19.0	5.5
				1500	54.1	2.97	43.9	103.4	5.33	7.0	1500	50.8	33.6	0.66	2.69	60.0	18.9	5.9
	10.0	2.2	5.1	1250	56.6	3.09	46.1	111.9	5.37	7.8	1250	49.8	30.4	0.61	2.53	58.4	19.6	5.2
				1500	56.9	3.00	46.6	105.1	5.56	7.2	1500	51.3	34.1	0.66	2.63	60.2	19.5	5.6
	14.0	4.2	9.8	1250	57.3	3.13	46.6	112.4	5.37	8.0	1250	50.1	30.6	0.61	2.49	58.6	20.1	4.8
				1500	57.5	3.04	47.1	105.5	5.55	7.4	1500	51.7	34.3	0.66	2.58	60.5	20.0	5.3
90	6.0	0.8	1.9	1250	57.6	3.13	46.9	112.7	5.40	8.5	1250	45.7	28.6	0.63	2.94	55.7	15.6	7.4
				1500	57.7	3.04	47.4	105.6	5.56	7.8	1500	47.1	31.8	0.67	3.02	57.4	15.6	7.8
	10.0	2.1	5.0	1250	61.5	3.18	50.7	115.5	5.67	8.7	1250	46.2	28.9	0.62	2.87	56.0	16.1	6.9
				1500	61.5	3.06	51.0	108.0	5.89	8.1	1500	47.6	32.2	0.68	2.97	57.7	16.0	7.5
	14.0	4.1	9.4	1250	61.9	3.23	50.9	115.8	5.62	9.0	1250	46.6	29.1	0.63	2.84	56.2	16.4	6.4
				1500	61.8	3.11	51.1	108.1	5.82	8.3	1500	48.1	32.4	0.67	2.92	58.0	16.5	7.1
100	6.0	0.8	1.8	Operation not recommended							Operation not recommended							
	10.0	2.1	4.8								1250	44.3	29.0	0.65	3.28	55.5	13.5	9.0
											1500	45.6	32.0	0.70	3.36	57.1	13.6	9.7
	14.0	3.9	9.1								1250	44.7	29.3	0.66	3.23	55.8	13.8	8.3
											1500	46.2	32.4	0.70	3.31	57.5	13.9	9.2
110	6.0	0.8	1.8								Operation not recommended							
	10.0	2.0	4.6	Operation not recommended							1250	39.9	27.3	0.69	3.71	52.6	10.7	11.3
											1500	41.1	30.0	0.73	3.79	54.1	10.9	12.3
	14.0	3.8	8.7								1250	40.4	27.8	0.69	3.66	52.9	11.0	10.5
											1500	41.7	30.5	0.73	3.73	54.4	11.2	11.7
120	6.0	0.7	1.7								Operation not recommended							
	10.0	1.9	4.4								1250	37.3	27.5	0.74	4.21	51.6	8.9	14.0
											1500	38.4	29.9	0.78	4.26	53.0	9.0	15.2
	14.0	3.6	8.4								1250	37.9	28.0	0.74	4.16	52.0	9.1	13.0
											1500	39.0	30.5	0.78	4.21	53.4	9.3	14.5

ND064 - Dual Capacity - ECM

High Speed (1800 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20				Operation not recommended							Operation not recommended							
	12.0	3.8	8.8															
	16.0	6.5	15.1	1500	39.3	3.48	27.5	94.3	3.31	6.2								
				1800	40.3	3.64	27.9	90.7	3.24	5.6								
30	8.0	1.8	4.1	Operation not recommended							Operation not recommended							
	12.0	3.7	8.6	1500	45.4	3.49	33.4	98.0	3.81	6.5	1500	67.1	42.9	0.64	2.35	75.1	28.6	---
				1800	46.6	3.72	33.9	94.0	3.68	6.0	1800	67.7	46.7	0.69	2.49	76.2	27.2	---
	16.0	6.4	14.7	1500	46.0	3.58	33.8	98.4	3.76	6.7	1500	67.8	43.3	0.64	2.31	75.6	29.4	---
				1800	47.1	3.75	34.3	94.2	3.68	6.1	1800	68.2	47.1	0.69	2.45	76.6	27.9	---
40	8.0	1.7	4.0	Operation not recommended							Operation not recommended							
	12.0	3.6	8.3	1500	52.2	3.72	39.5	102.2	4.11	7.2	1500	69.7	44.1	0.63	2.70	78.9	25.8	---
				1800	53.4	3.88	40.1	97.5	4.03	6.6	1800	70.7	48.0	0.68	2.86	80.5	24.7	---
	16.0	6.2	14.2	1500	53.0	3.79	40.1	102.7	4.10	7.4	1500	70.4	44.5	0.63	2.65	79.5	26.6	---
				1800	54.2	3.92	40.8	97.9	4.05	6.7	1800	71.4	48.4	0.68	2.82	81.0	25.3	---
50	8.0	1.7	3.8	1500	55.7	3.88	42.4	104.4	4.21	7.8	1500	70.8	44.4	0.63	3.15	81.6	22.5	4.0
				1800	56.8	4.00	43.2	99.2	4.17	7.2	1800	72.3	48.3	0.67	3.35	83.7	21.6	4.2
	12.0	3.5	8.1	1500	58.9	3.95	45.4	106.3	4.37	8.0	1500	71.6	44.8	0.63	3.09	82.1	23.2	3.7
				1800	60.1	4.05	46.2	100.9	4.35	7.4	1800	73.0	48.8	0.67	3.28	84.2	22.3	4.0
	16.0	6.0	13.8	1500	59.8	4.00	46.2	106.9	4.39	8.2	1500	72.3	45.3	0.63	3.03	82.6	23.8	3.4
				1800	61.1	4.09	47.2	101.5	4.38	7.5	1800	73.7	49.2	0.67	3.23	84.7	22.9	3.8
60	8.0	1.6	3.7	1500	62.4	4.14	48.3	108.5	4.42	8.7	1500	69.2	44.0	0.64	3.40	80.8	20.4	4.8
				1800	63.8	4.21	49.4	102.8	4.44	8.0	1800	71.0	47.8	0.67	3.62	83.3	19.6	5.1
	12.0	3.4	7.8	1500	65.3	4.21	50.9	110.3	4.54	9.0	1500	69.9	44.4	0.64	3.33	81.3	21.0	4.5
				1800	66.7	4.26	52.2	104.3	4.58	8.3	1800	71.7	48.3	0.67	3.54	83.8	20.2	4.9
	16.0	5.8	13.4	1500	66.7	4.26	52.2	111.2	4.59	9.2	1500	70.6	44.9	0.64	3.28	81.8	21.5	4.2
				1800	68.2	4.31	53.5	105.1	4.64	8.5	1800	72.4	48.8	0.67	3.48	84.3	20.8	4.6
70	8.0	1.6	3.6	1500	69.3	4.44	54.1	112.8	4.58	9.8	1500	69.8	44.4	0.64	3.78	82.7	18.5	6.1
				1800	70.8	4.46	55.6	106.4	4.65	9.0	1800	72.0	48.2	0.67	4.03	85.7	17.9	6.4
	12.0	3.3	7.5	1500	71.8	4.50	56.4	114.3	4.68	10.1	1500	70.5	44.8	0.64	3.71	83.1	19.0	5.7
				1800	73.4	4.51	58.0	107.8	4.77	9.3	1800	72.8	48.7	0.67	3.94	86.2	18.5	6.1
	16.0	5.6	12.9	1500	73.6	4.55	58.1	115.5	4.74	10.4	1500	71.2	45.3	0.64	3.64	83.6	19.5	5.3
				1800	75.4	4.55	59.8	108.8	4.85	9.6	1800	73.4	49.2	0.67	3.88	86.7	18.9	5.8
80	8.0	1.5	3.5	1500	76.1	4.73	60.0	117.0	4.72	11.0	1500	65.7	42.9	0.65	4.10	79.7	16.0	7.7
				1800	77.9	4.70	61.8	110.1	4.86	10.2	1800	68.2	46.6	0.68	4.37	83.1	15.6	8.1
	12.0	3.2	7.3	1500	77.9	4.78	61.6	118.1	4.77	11.3	1500	66.4	43.3	0.65	4.02	80.2	16.5	7.1
				1800	79.8	4.74	63.6	111.0	4.94	10.5	1800	68.9	47.0	0.68	4.28	83.5	16.1	7.7
	16.0	5.4	12.5	1500	80.3	4.84	63.7	119.5	4.86	11.7	1500	67.1	43.8	0.65	3.95	80.6	17.0	6.6
				1800	82.3	4.78	66.0	112.3	5.04	10.8	1800	69.6	47.5	0.68	4.21	83.9	16.5	7.4
90	8.0	1.4	3.3	1500	83.0	5.05	65.8	121.2	4.82	12.4	1500	60.5	41.3	0.68	4.40	75.5	13.8	9.6
				1800	85.0	4.97	68.0	113.7	5.01	11.4	1800	63.2	44.9	0.71	4.68	79.1	13.5	10.2
	12.0	3.0	7.0	1500	84.1	5.10	66.7	121.9	4.83	12.7	1500	61.2	41.7	0.68	4.31	75.9	14.2	9.0
				1800	86.2	5.00	69.1	114.3	5.06	11.8	1800	63.7	45.3	0.71	4.59	79.4	13.9	9.7
	16.0	5.2	12.0	1500	87.0	5.17	69.4	123.7	4.93	13.1	1500	61.8	42.2	0.68	4.24	76.2	14.6	8.3
				1800	89.3	5.05	72.0	115.9	5.18	12.2	1800	64.4	45.8	0.71	4.51	79.8	14.3	9.2
100	8.0	1.4	3.2								Operation not recommended							
	12.0	2.9	6.8								1500	59.5	40.6	0.68	4.76	75.7	12.5	11.1
											1800	62.3	44.2	0.71	5.07	79.6	12.3	12.1
	16.0	5.0	11.6								1500	60.0	41.1	0.68	4.68	76.0	12.8	10.3
											1800	62.9	44.6	0.71	4.99	79.9	12.6	11.5
110	8.0	1.3	3.1								Operation not recommended							
	12.0	2.8	6.5	Operation not recommended							1500	52.6	37.1	0.71	5.09	69.9	10.3	13.6
											1800	55.4	40.3	0.73	5.43	73.9	10.2	14.8
	16.0	4.8	11.2								1500	53.1	37.5	0.71	5.00	70.1	10.6	12.7
											1800	55.9	40.8	0.73	5.34	74.1	10.5	14.1
120	8.0	1.3	3.0								Operation not recommended							
	12.0	2.7	6.3								1500	51.2	37.8	0.74	5.62	70.3	9.1	16.5
											1800	54.2	41.1	0.76	6.00	74.6	9.0	17.9
	16.0	4.6	10.7								1500	51.6	38.2	0.74	5.52	70.5	9.4	15.3
											1800	54.6	41.5	0.76	5.90	74.7	9.3	17.0

ND072 - Dual Capacity - ECM

Low Speed (1700 CFM)

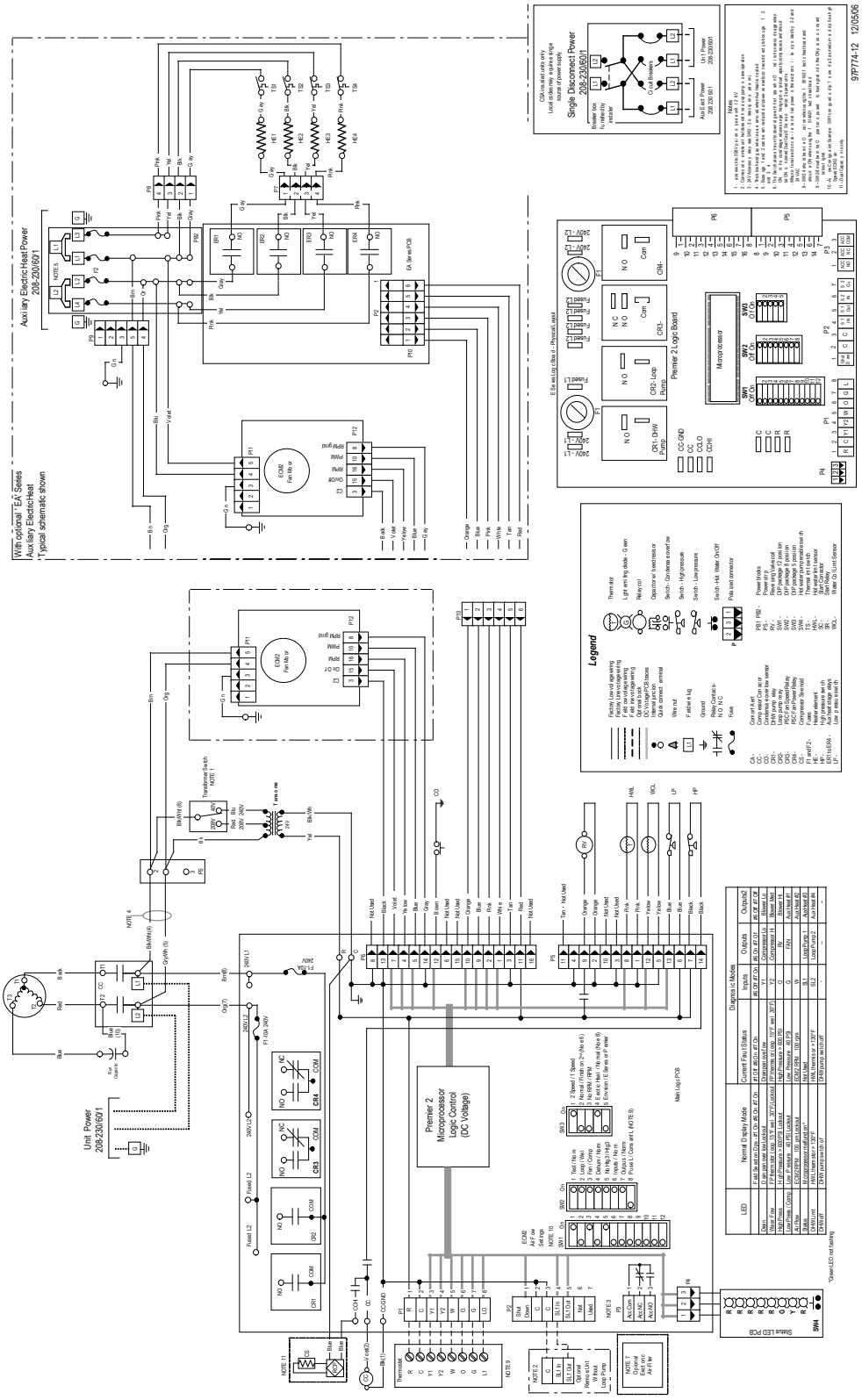
	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20				Operation not recommended							Operation not recommended							
	13.0	3.6	8.2															
	16.0	5.0	11.6	1400	32.4	3.36	21.0	91.4	2.83	6.0								
				1700	34.0	3.40	22.4	88.5	2.93	5.4								
30	10.0	2.3	5.3	Operation not recommended							Operation not recommended							
	13.0	3.5	8.0	1400	36.2	3.38	24.7	93.9	3.14	6.1	1400	55.1	33.7	0.61	1.82	61.3	30.3	---
				1700	38.0	3.42	26.3	90.7	3.25	5.6	1700	57.0	38.7	0.68	1.94	63.6	29.4	---
	16.0	4.9	11.3	1400	37.8	3.38	26.2	95.0	3.28	6.3	1400	55.2	33.6	0.61	1.75	61.2	31.6	---
				1700	39.6	3.42	27.9	91.6	3.39	5.7	1700	56.8	38.6	0.68	1.88	63.2	30.2	---
40	10.0	2.2	5.1	Operation not recommended							Operation not recommended							
	13.0	3.4	7.8	1400	42.6	3.48	30.7	98.1	3.58	6.5	1400	57.7	35.7	0.62	2.00	64.5	28.9	---
				1700	44.4	3.49	32.5	94.2	3.73	5.9	1700	59.5	40.8	0.68	2.12	66.7	28.1	---
	16.0	4.7	11.0	1400	44.1	3.49	32.1	99.1	3.70	6.7	1400	57.8	35.6	0.62	1.93	64.4	29.9	---
				1700	46.0	3.50	34.1	95.1	3.85	6.1	1700	59.5	40.7	0.68	2.06	66.5	28.9	---
50	10.0	2.1	4.9	1400	47.6	3.52	35.6	101.5	3.96	6.8	1400	59.7	37.3	0.62	2.30	67.6	25.9	2.3
				1700	49.7	3.48	37.8	97.1	4.18	6.3	1700	61.6	42.2	0.69	2.42	69.8	25.4	2.4
	13.0	3.3	7.5	1400	48.3	3.56	36.1	101.9	3.98	7.0	1400	59.9	37.6	0.63	2.22	67.5	26.9	2.1
				1700	50.2	3.54	38.2	97.4	4.16	6.4	1700	61.7	42.7	0.69	2.34	69.7	26.4	2.3
	16.0	4.6	10.6	1400	49.7	3.58	37.5	102.9	4.07	7.2	1400	60.0	37.6	0.63	2.16	67.4	27.7	2.0
				1700	51.8	3.56	39.7	98.2	4.27	6.6	1700	61.9	42.7	0.69	2.28	69.6	27.1	2.2
60	10.0	2.1	4.8	1400	52.9	3.63	40.5	105.0	4.27	7.5	1400	58.0	36.8	0.63	2.53	66.6	22.9	3.2
				1700	55.1	3.56	43.0	100.0	4.54	6.9	1700	59.7	41.5	0.70	2.64	68.7	22.6	3.4
	13.0	3.2	7.3	1400	54.4	3.67	41.9	106.0	4.34	7.7	1400	58.2	37.1	0.64	2.45	66.6	23.8	3.0
				1700	56.5	3.61	44.2	100.8	4.60	7.1	1700	60.0	42.0	0.70	2.56	68.7	23.4	3.2
	16.0	4.4	10.3	1400	55.6	3.71	43.0	106.8	4.40	7.9	1400	58.5	37.2	0.64	2.40	66.7	24.4	2.8
				1700	57.9	3.64	45.4	101.5	4.66	7.3	1700	60.3	42.1	0.70	2.50	68.8	24.1	3.1
70	10.0	2.0	4.6	1400	58.4	3.76	45.5	108.6	4.54	8.3	1400	57.6	37.3	0.65	2.83	67.2	20.4	4.5
				1700	60.7	3.65	48.3	103.1	4.87	7.7	1700	59.2	42.0	0.71	2.94	69.3	20.2	4.8
	13.0	3.0	7.0	1400	60.6	3.80	47.6	110.1	4.67	8.5	1400	57.9	37.8	0.65	2.74	67.3	21.2	4.2
				1700	62.9	3.69	50.3	104.3	5.00	7.9	1700	59.6	42.5	0.71	2.85	69.3	20.9	4.5
	16.0	4.3	9.9	1400	61.7	3.86	48.5	110.8	4.69	8.8	1400	58.2	38.0	0.65	2.70	67.5	21.6	3.9
				1700	64.0	3.75	51.3	104.9	5.01	8.1	1700	60.1	42.7	0.71	2.79	69.6	21.5	4.3
80	10.0	1.9	4.5	1400	62.9	3.86	49.7	111.6	4.77	9.2	1400	54.9	36.5	0.66	3.15	65.7	17.4	6.2
				1700	65.2	3.72	52.5	105.5	5.13	8.5	1700	56.6	40.8	0.72	3.24	67.7	17.5	6.6
	13.0	2.9	6.8	1400	66.2	3.91	52.8	113.8	4.97	9.5	1400	55.4	36.9	0.67	3.07	65.9	18.0	5.8
				1700	68.5	3.75	55.8	107.3	5.36	8.8	1700	57.0	41.3	0.72	3.16	67.8	18.0	6.3
	16.0	4.2	9.6	1400	66.9	3.96	53.4	114.3	4.95	9.8	1400	55.8	37.1	0.67	3.02	66.1	18.5	5.4
				1700	69.2	3.81	56.2	107.7	5.32	9.1	1700	57.5	41.5	0.72	3.11	68.1	18.5	6.0
90	10.0	1.9	4.3	1400	67.5	3.97	53.9	114.6	4.98	10.3	1400	50.7	34.7	0.68	3.50	62.7	14.5	8.3
				1700	69.7	3.81	56.7	108.0	5.37	9.5	1700	52.3	38.5	0.74	3.57	64.5	14.6	8.8
	13.0	2.8	6.6	1400	71.9	4.03	58.1	117.5	5.23	10.6	1400	51.2	35.0	0.68	3.43	62.9	14.9	7.7
				1700	74.3	3.83	61.2	110.4	5.69	9.8	1700	52.8	39.0	0.74	3.50	64.8	15.1	8.4
	16.0	4.0	9.3	1400	72.3	4.08	58.4	117.8	5.19	11.0	1400	51.8	35.3	0.68	3.37	63.3	15.3	7.2
				1700	74.6	3.90	61.3	110.6	5.60	10.2	1700	53.4	39.3	0.74	3.45	65.1	15.5	8.0
100	10.0	1.8	4.2								Operation not recommended							
	13.0	2.7	6.3								1400	49.1	34.9	0.71	3.87	62.4	12.7	10.0
											1700	50.7	38.7	0.76	3.92	64.1	12.9	10.9
	16.0	3.9	8.9								1400	49.8	35.3	0.71	3.82	62.8	13.0	9.3
											1700	51.3	39.1	0.76	3.86	64.5	13.3	10.4
110	10.0	1.7	4.0								Operation not recommended							
	13.0	2.6	6.1	Operation not recommended							1400	43.7	32.7	0.75	4.33	58.4	10.1	12.7
											1700	45.2	36.1	0.80	4.35	60.0	10.4	13.8
	16.0	3.7	8.6								1400	44.4	33.2	0.75	4.27	59.0	10.4	11.8
											1700	45.7	36.6	0.80	4.29	60.4	10.7	13.1
120	10.0	1.7	3.8								Operation not recommended							
	13.0	2.5	5.8								1400	40.8	31.9	0.78	4.88	57.5	8.4	15.8
											1700	42.3	34.9	0.83	4.86	58.9	8.7	17.1
	16.0	3.6	8.2								1400	41.7	32.5	0.78	4.80	58.0	8.7	14.6
											1700	42.8	35.5	0.83	4.79	59.2	8.9	16.3

ND072 - Dual Capacity - ECM

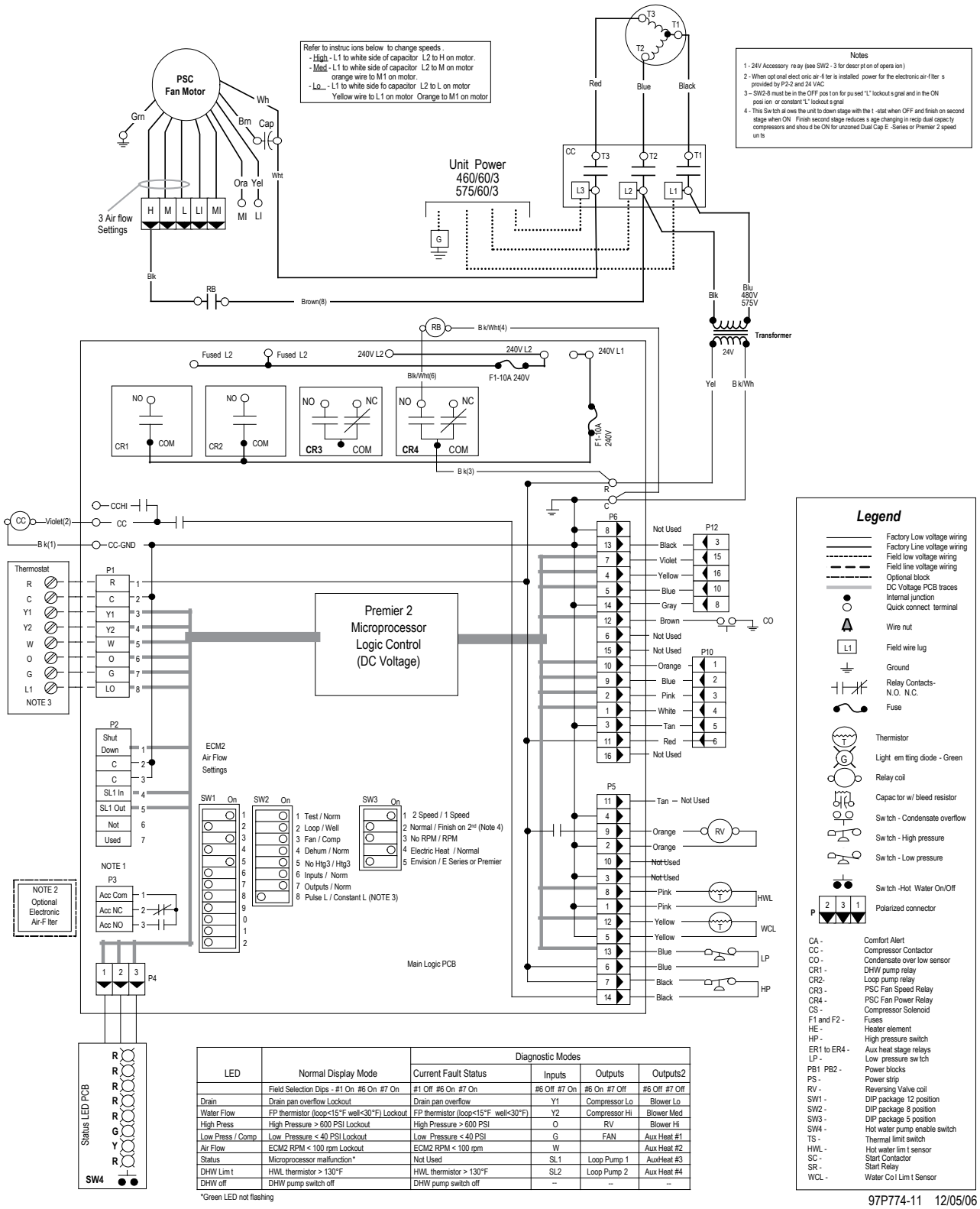
High Speed (2200 CFM)

	Flow	Water		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
EWT	Rate	Pressure Drop		Airflow	HC	Power	HE	LAT		HWC	Airflow	TC	SC	S/T	Power	HR		HWC
°F	GPM	PSI	FT/HD	CFM	kBtuh	kW	kBtuh	°F	COP	kBtuh	CFM	kBtuh	kBtuh	Ratio	kW	kBtuh	EER	kBtuh
20				Operation not recommended							Operation not recommended							
	15.0	4.6	10.7															
	18.0	6.2	14.3	1850	45.4	4.08	31.4	92.7	3.26	7.9								
				2200	47.1	4.34	32.2	89.8	3.18	7.1								
30	12.0	3.2	7.4	Operation not recommended							Operation not recommended							
	15.0	4.5	10.4	1850	52.6	4.24	38.1	96.3	3.64	8.3	1850	71.9	43.9	0.61	2.56	80.7	28.1	---
				2200	54.5	4.51	39.1	92.9	3.54	7.6	2200	73.3	47.8	0.65	2.71	82.5	27.0	---
	18.0	6.0	13.9	1850	53.0	4.28	38.4	96.5	3.63	8.6	1850	72.7	44.7	0.61	2.52	81.2	28.9	---
				2200	55.0	4.55	39.5	93.1	3.54	7.8	2200	74.0	48.1	0.65	2.67	83.1	27.7	---
40	12.0	3.1	7.1	Operation not recommended							Operation not recommended							
	15.0	4.4	10.1	1850	61.0	4.50	45.6	100.5	3.97	9.2	1850	74.8	46.7	0.62	3.09	85.3	24.2	---
				2200	63.1	4.71	47.0	96.5	3.92	8.4	2200	76.2	50.8	0.67	3.28	87.4	23.3	---
	18.0	5.8	13.5	1850	61.9	4.55	46.3	101.0	3.98	9.5	1850	75.6	47.6	0.63	3.03	85.9	24.9	---
				2200	64.0	4.76	47.8	96.9	3.94	8.6	2200	77.0	51.2	0.66	3.23	88.0	23.9	---
50	12.0	3.0	6.9	1850	64.9	4.69	48.9	102.5	4.06	9.9	1850	76.2	48.6	0.64	3.75	89.0	20.3	4.3
				2200	67.1	4.86	50.5	98.2	4.05	9.2	2200	77.8	52.8	0.68	3.98	91.4	19.5	4.6
	15.0	4.2	9.8	1850	68.6	4.78	52.3	104.3	4.21	10.3	1850	77.0	49.1	0.64	3.67	89.5	21.0	4.0
				2200	70.9	4.94	54.0	99.8	4.21	9.4	2200	78.5	53.4	0.68	3.90	91.8	20.1	4.4
	18.0	5.7	13.1	1850	69.8	4.84	53.3	104.9	4.23	10.6	1850	77.8	50.1	0.64	3.61	90.1	21.5	3.7
				2200	72.1	4.99	55.1	100.3	4.24	9.7	2200	79.3	53.9	0.68	3.84	92.4	20.6	4.2
60	12.0	2.9	6.7	1850	73.0	5.00	56.0	106.5	4.28	11.1	1850	74.8	48.7	0.65	3.99	88.4	18.8	5.3
				2200	75.4	5.10	58.0	101.7	4.33	10.3	2200	76.4	52.6	0.69	4.24	90.9	18.0	5.6
	15.0	4.1	9.5	1850	76.2	5.08	58.9	108.2	4.39	11.5	1850	75.6	49.2	0.65	3.90	88.9	19.4	4.9
				2200	78.7	5.17	61.1	103.1	4.47	10.6	2200	77.1	53.2	0.69	4.15	91.3	18.6	5.3
	18.0	5.5	12.7	1850	77.9	5.15	60.4	109.0	4.44	11.8	1850	76.4	49.9	0.65	3.83	89.5	19.9	4.6
				2200	80.5	5.22	62.7	103.9	4.52	10.9	2200	77.9	53.7	0.69	4.08	91.9	19.1	5.1
70	12.0	2.8	6.5	1850	81.2	5.31	63.0	110.6	4.48	12.5	1850	74.8	49.6	0.66	4.43	89.9	16.9	6.6
				2200	83.7	5.35	65.5	105.2	4.59	11.6	2200	76.4	53.4	0.70	4.71	92.4	16.2	7.0
	15.0	4.0	9.1	1850	84.0	5.39	65.6	112.0	4.56	12.9	1850	75.5	50.2	0.66	4.34	90.3	17.4	6.2
				2200	86.7	5.40	68.2	106.5	4.70	11.9	2200	77.1	53.9	0.70	4.61	92.8	16.7	6.7
	18.0	5.3	12.2	1850	86.2	5.46	67.5	113.1	4.63	13.3	1850	76.4	50.7	0.66	4.26	90.9	17.9	5.7
				2200	89.0	5.46	70.4	107.5	4.78	12.3	2200	77.9	54.5	0.70	4.54	93.4	17.1	6.4
80	12.0	2.7	6.3	1850	88.3	5.66	69.0	114.2	4.57	14.1	1850	71.5	48.3	0.68	4.76	87.8	15.0	8.4
				2200	91.2	5.62	72.0	108.4	4.75	13.0	2200	73.0	52.2	0.72	5.07	90.3	14.4	8.9
	15.0	3.8	8.8	1850	90.4	5.74	70.8	115.3	4.62	14.5	1850	72.2	48.8	0.68	4.66	88.1	15.5	7.8
				2200	93.3	5.66	74.0	109.3	4.83	13.4	2200	73.7	52.7	0.71	4.96	90.7	14.9	8.4
	18.0	5.1	11.8	1850	93.2	5.81	73.3	116.6	4.70	15.0	1850	73.0	49.5	0.68	4.58	88.7	15.9	7.2
				2200	96.3	5.72	76.7	110.5	4.93	13.8	2200	74.5	53.3	0.71	4.88	91.2	15.3	8.0
90	12.0	2.6	6.0	1850	95.6	6.03	75.1	117.9	4.65	15.8	1850	66.9	45.9	0.69	4.98	83.9	13.4	10.5
				2200	98.8	5.90	78.6	111.6	4.90	14.7	2200	68.3	49.9	0.73	5.30	86.4	12.9	11.1
	15.0	3.7	8.5	1850	97.0	6.09	76.2	118.5	4.67	16.3	1850	67.5	46.4	0.69	4.87	84.2	13.9	9.8
				2200	100.1	5.93	79.9	112.1	4.95	15.1	2200	68.9	50.3	0.73	5.19	86.6	13.3	10.6
	18.0	4.9	11.4	1850	100.3	6.17	79.2	120.2	4.76	16.8	1850	68.3	47.3	0.69	4.80	84.6	14.2	9.1
				2200	103.6	6.00	83.2	113.6	5.06	15.6	2200	69.7	50.9	0.73	5.11	87.1	13.6	10.1
100	12.0	2.5	5.8	Operation not recommended							Operation not recommended							
	15.0	3.6	8.2								1850	64.7	45.7	0.71	5.38	83.1	12.0	12.2
											2200	66.1	49.4	0.75	5.72	85.6	11.5	13.2
	18.0	4.8	11.0								1850	65.5	46.4	0.71	5.29	83.5	12.4	11.3
											2200	66.8	49.8	0.75	5.63	86.0	11.9	12.5
110	12.0	2.4	5.6	Operation not recommended							Operation not recommended							
	15.0	3.4	7.9								1850	57.8	42.3	0.73	5.62	77.0	10.3	14.9
											2200	59.0	45.5	0.77	5.98	79.4	9.9	16.1
	18.0	4.6	10.6								1850	58.4	42.7	0.73	5.52	77.3	10.6	13.8
											2200	59.6	45.9	0.77	5.88	79.7	10.2	15.3
120	12.0	2.3	5.4	Operation not recommended							Operation not recommended							
	15.0	3.3	7.6								1850	54.7	41.0	0.75	6.17	75.8	8.9	18.0
											2200	55.8	44.3	0.79	6.57	78.2	8.5	19.5
	18.0	4.4	10.2								1850	55.3	41.5	0.75	6.06	76.0	9.1	16.7
											2200	56.5	44.6	0.79	6.44	78.4	8.8	18.5

Wiring Schematic - Premier Control 208-230/60/1



Wiring Schematic - Premier Control 460-575/60/3



LED	Normal Display Mode	Diagnostic Modes			
		Current Fault Status	Inputs	Outputs	Outputs2
	Field Selection Dips - #1 On #6 On #7 On	#1 Off #6 On #7 On	#6 Off #7 On	#6 On #7 Off	#6 Off #7 Off
Drain	Drain pan overflow Lockout	Drain pan overflow	Y1	Compressor Lo	Blower Lo
Water Flow	FP thermistor (loop<15°F well<30°F) Lockout	FP thermistor (loop<15°F well<30°F)	Y2	Compressor Hi	Blower Med
High Press	High Pressure > 600 PSI Lockout	High Pressure > 600 PSI	O	RV	Blower Hi
Low Press / Comp	Low Pressure < 40 PSI Lockout	Low Pressure < 40 PSI	G	FAN	Aux Heat #1
Air Flow	ECM2 RPM < 100 rpm Lockout	ECM2 RPM < 100 rpm	W		Aux Heat #2
Status	Microprocessor malfunction*	Not Used	SL1	Loop Pump 1	AuxHeat #3
DHW Lim t	HWL thermistor > 130°F	HWL thermistor > 130°F	SL2	Loop Pump 2	Aux Heat #4
DHW off	DHW pump switch off	DHW pump switch off	--	--	--

*Green LED not flashing

Legend

- Factory Low voltage wiring
- Factory Line voltage wiring
- Field low voltage wiring
- Field line voltage wiring
- Optional block
- DC Voltage PCB traces
- Internal junction
- Quick connect terminal
- Wire nut
- L1 Field wire lug
- Ground
- Relay Contacts- N.O. N.C.
- Fuse
- T Thermistor
- G Light em tting diode - Green
- Relay coil
- Capac tor w/ bleed resistor
- Sw tch - Condensate overflow
- Sw tch - High pressure
- Sw tch - Low pressure
- Sw tch -Hot Water On/Off
- P 2 3 1 Polarized connector

CA -	Comfort Alert
CC -	Compressor Contactor
CO -	Condensate over low sensor
CR1 -	DHW pump relay
CR2-	Loop pump relay
CR3 -	PSC Fan Speed Relay
CR4 -	PSC Fan Power Relay
CS -	Compressor Solenoid
F1 and F2 -	Fuses
HE -	Heater element
HP -	High pressure switch
ER1 to ER4 -	Aux heat stage relays
LP -	Low pressure sw tch
PB1 PB2 -	Power blocks
PS -	Power strip
RV -	Reversing Valve coil
SW1 -	DIP package 12 position
SW2 -	DIP package 8 position
SW3 -	DIP package 5 position
SW4 -	Hot water pump enable switch
TS -	Thermal limit switch
HWL -	Hot water lim t sensor
SC -	Start Contactor
SR -	Start Relay
WCL -	Water Co l Lim t Sensor

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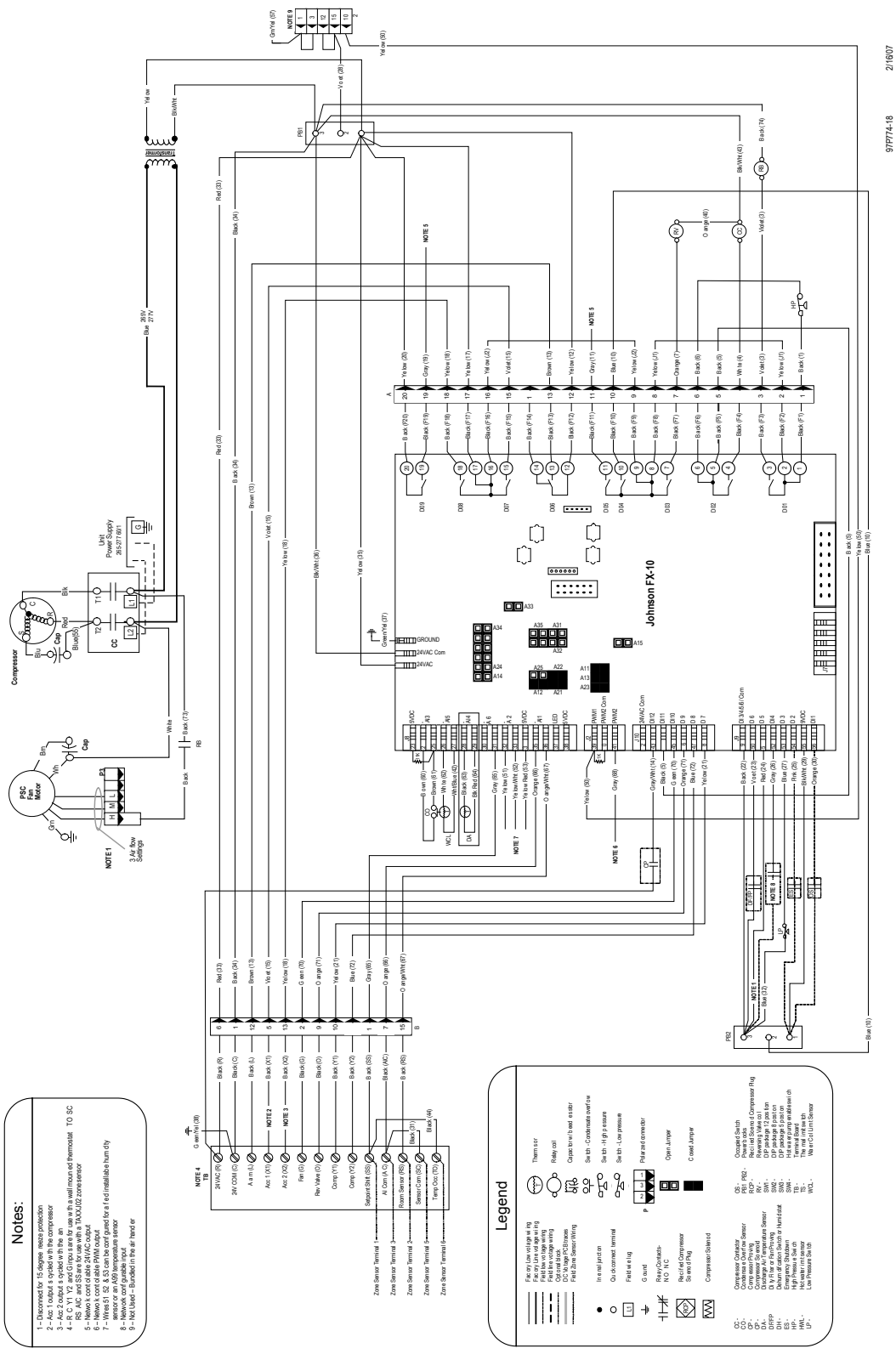
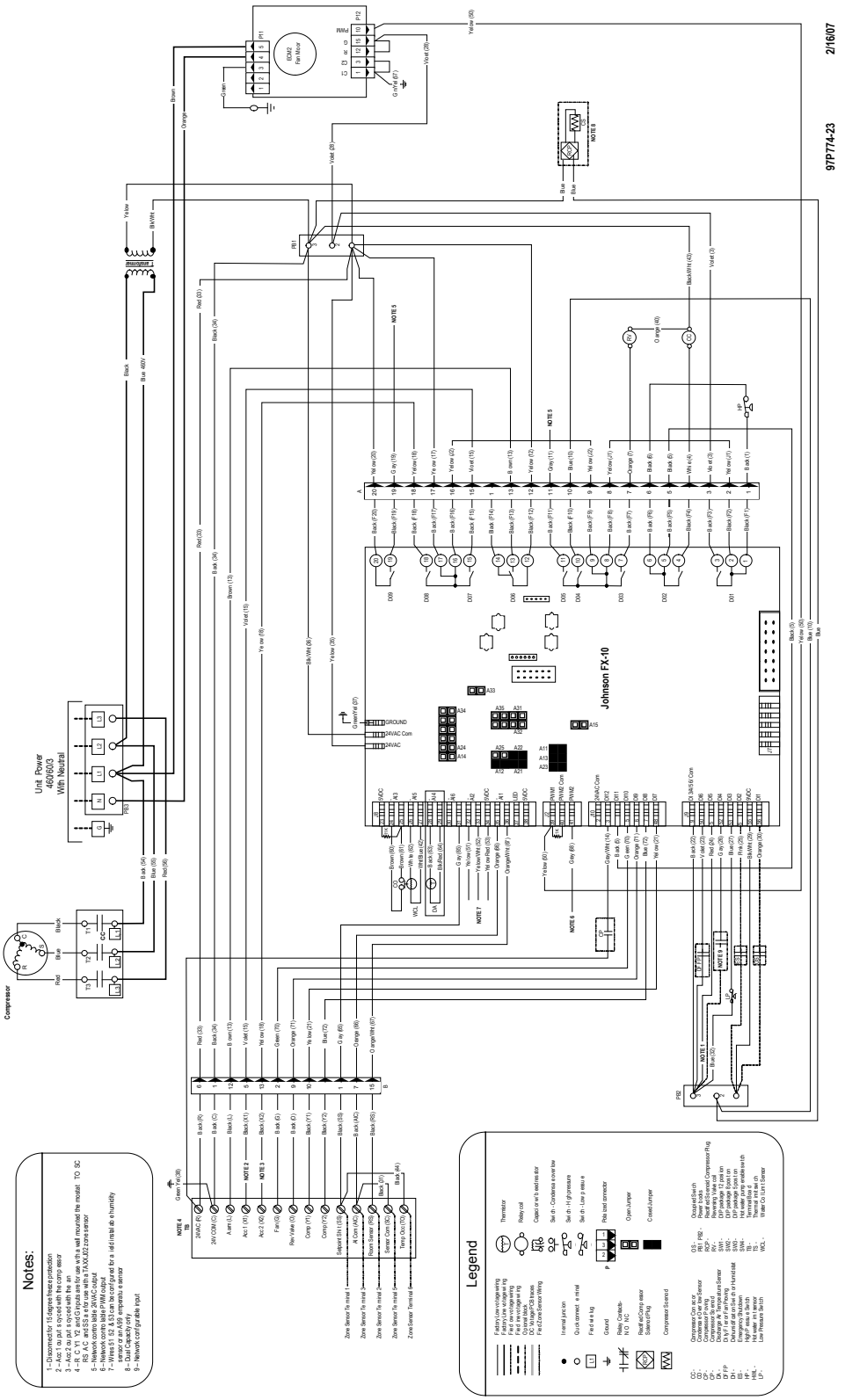
Wiring Schematic - FX10 Control 265-270/60/1


Notes:
1 - Disconnect for 15-degree resistor protection
2 – Aux 1 output is provided with the compressor
3 – Aux 2 output is provided with the air
4 – R, C, Y1, Y2, and G inputs are for use with a wall mount ed thermostat. TO SC
RS, AIC, and SS are for use with a
5 – Make sure cont ol selection matches output
6 – Make sure cont ol also has PWM output
7 – Wires 51, 52, & 53 can be conf gured for a fie d installe hum idity
sensor or an A99 temperature sensor
8 – Remove wire if not used
9 – Not Used – Bundled in the air handler
Legend
Johnson FX-10
Compressor
Capacitor
Start
Run
PSC Fan Motor
3 Air flow Settings
Unit Power Supply 265-277 60/1
NOTE 1
NOTE 2
NOTE 3
NOTE 4
NOTE 5
NOTE 6
NOTE 7
NOTE 8
NOTE 9
9TP774-18
2/16/07

Wiring Schematic - FX10 Control 460/60/3



Engineering Guide Specifications

General

Furnish and install WaterFurnace Water Source Heat Pumps, as indicated on the plans. Equipment shall be completely assembled, piped and internally wired. Capacities and characteristics as listed in the schedule and the specifications that follow. The reverse cycle heating/cooling units shall be either suspended type with horizontal air inlet and discharge or floor mounted type with horizontal air inlet and vertical upflow/downflow air discharge. Units shall be AHRI/ISO 13256-1 certified and listed by a nationally recognized safety-testing laboratory or agency, such as ETL Testing Laboratory. Each unit shall be computer run-tested at the factory with conditioned water and operation verified to catalog data. Each unit shall be mounted on a pallet and shipped in a corrugated box or stretch-wrapped. The units shall be designed to operate with entering liquid temperature between 20°F and 120°F [-6.7°C and 48.9°C].

Casing and Cabinet

The cabinet shall be fabricated from heavy-gauge galvanized steel and finished with corrosion-resistant powder coating. This corrosion protection system shall meet the stringent 1000 hour salt spray test per ASTM B117. The interior shall be insulated with 1/2″ thick, multi-density, cleanable aluminum foil coated glass fiber with edges sealed or tucked under flanges to prevent the introduction of glass fibers into the discharge air. Standard cabinet panel insulation must meet NFPA 90A requirements, air erosion and mold growth limits of UL-181, stringent fungal resistance test per ASTM-C1071 and ASTM G21, and shall meet zero level bacteria growth per ASTM G22. Unit insulation must meet these stringent requirements or unit(s) will not be accepted.

One (horizontal) to two (vertical) blower and three compressor compartment access panels shall be 'lift-out' removable with supply and return ductwork in place..

A duct collar shall be provided on the supply air opening. Standard size 1 in. [2.5 cm] MERV 8 pleated filters shall be provided with each unit. Units shall have a return air filter rack/duct collar that Is field convertible from 1 in. [2.5 cm] to 2 in. [5.1 cm]. The upflow vertical units shall have a removable insulated divider panel between the air handling section and the compressor section to minimize the transmission of compressor noise and to permit operational service testing without air bypass. Vertical units shall be supplied with left or right horizontal air inlet and top vertical air discharge. Horizontal units shall be supplied with left or right air inlet and side or end air discharge.

The compressor shall be double isolation mounted using selected durometer grommets to provide vibration free compressor mounting. The compressor mounting bracket shall be acoustically deadened galvanized steel to prevent vibration transmission to the cabinet.

Option: MERV 13 Filter - A 2″ [5.1 cm] wide MERV 13 filter shall be installed in filter rack for high efficiency filter applications.

Option: A Super Quiet Sound package shall include multi-density full coverage compressor blanket and sound deadening multi-density laminated metal plate under the compressor.

Option: An internally mounted low pressure drop (high Cv) water solenoid valve shall be factory installed for use in variable speed pumping applications.

Option: An internally mounted low wattage circulating pump shall be factory installed for use in primary/secondary or load match pumping systems.
The drain pan shall be of plastic construction to inhibit corrosion inhibit bacterial growth. Drain outlet shall be located on pan as to allow complete and unobstructed drainage of condensate. The unit as standard will be supplied with solid-state electronic condensate overflow protection. Mechanical float switches WILL NOT be accepted. Vertical units shall be furnished with a PVC slip condensate drain connection and an internal factory installed condensate trap. Horizontal units shall have a pipe drain connection suitable for standard 3/4″ PVC glue fittings.

Refrigerant Circuit

All units shall utilize the non-ozone depleting and low global warming potential refrigerant R410A. All units shall contain a sealed refrigerant circuit including a hermetic motor-compressor, bidirectional thermostatic expansion valve, finned tube air-to-refrigerant heat exchanger, reversing valve, coaxial tube water-to-refrigerant heat exchanger, optional desuperheater coil, and service ports.

Compressors shall be high-efficiency single speed rotary or scroll, or dual capacity scroll type designed for heat pump duty and mounted on vibration isolators. The compressor shall be double isolation mounted using selected durometer grommets to provide vibration free compressor mounting. The compressor mounting bracket shall be acoustically deadened galvanized steel to prevent vibration transmission to the cabinet. Compressor motors shall be single-phase PSC with overload protection.

The air coil shall be sized for low-face velocity and constructed of lanced aluminum fins bonded to rifled copper tubes in a staggered pattern not less than three rows deep for enhanced performance.

Option: FormiShield electro-coated air coil for maximum protection against formicary corrosion.

The coaxial water-to-refrigerant heat exchanger shall be designed for low water pressure drop and constructed of a convoluted copper (cupronickel option) inner tube and a steel outer tube. Refrigerant to air heat exchangers shall utilize enhanced corrugated lanced aluminum fins and rifled copper tube construction rated to withstand 600 PSIG (4135 kPa) refrigerant working pressure. Refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 600 PSIG (4135 kPa) working refrigerant pressure and 450 PSIG (3101 kPa) working water pressure. The thermostatic expansion valve shall provide proper superheat over the entire liquid temperature range with minimal "hunting." The valve shall operate bidirectionally without the use of check valves.

Option: Cupronickel refrigerant to water heat exchanger shall be of copper-nickel inner water tube and steel refrigerant outer tube design, rated to withstand 600 PSIG (4135 kPa) working refrigerant pressure and 450 PSIG (3101 kPa) working water pressure. Water lines shall also be of cupronickel construction.

Option: Desuperheater - Internal double wall vented desuperheater coil refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 600 PSIG (4135 kPa) working refrigerant pressure and 450 PSIG (3101 kPa) working water pressure.

Option: ThermaShield coated water-to-refrigerant heat exchanger, water lines and refrigerant suction lines shall be insulated to prevent condensation at low liquid temperatures below 50°F.

Option: AlpinePure Hot Gas Bypass
The hot gas bypass (HGB) option is designed to limit the minimum evaporating pressure in the cooling mode to prevent the air coil from icing. The option shall consist of a hot gas bypass

Engineering Guide Specifications cont.

valve installed in the discharge side of the compressor. The refrigerant control shall proportionately bypass hot gas refrigerant to the air coil when suction pressure falls below 115 psig thus limiting air coil freeze-up.

Optional AlpinePure Hot Gas Reheat
An optional hot gas reheat coil shall be available to allow dehumidification-only operation. The internal reheat system shall be factory installed and include a high efficiency reheat coil located downstream of the evaporator coil, a reclaim valve and integral controls to allow heating, cooling and reheat/dehumidification modes. The reheat coil shall be sized so that during reheat/dehumidification mode the unit will produce neutral air (78 3 3 °F DB @ 50-58% relative humidity) with typical 80 DB/67 WB °F entering air and 90 °F entering water temperature. The reheat coil shall be sized to restrict airflow by no more than 0.17 in wg at 350 feet per minute airflow velocity.
The FX10 control shall have three control options available:

Room wall dehumidistat – An optional room wall dehumidistat shall control the reheat mode thru a 24VAC 'Hum' input (On or Off). Setpoint and deadband shall be determined by the dehumidistat.

Duct humidity sensor – An optional duct humidity sensor shall be installed. The FX10 control reads the humidity from the sensor and determines operation mode. Setpoint and deadband are internally set by the FX10 control and shall be are adjustable. Continuous fan operation is a requirement for this mode to accurately measure relative humidity during the off cycle.

Room wall humidity sensor - An optional wall humidity sensor is installed. The FX10 control reads the humidity from the sensor and determines operation mode. Setpoint and dead band are internally set by the FX10 control and are adjustable. Continuous fan operation is NOT requirement for this mode.

Dehumidification Set Point (used only with a humidity sensor) - The factory default set point for dehumidification is 52% this is field adjustable from 30% to 60%. In addition there shall be a factory default differential of 5% field adjustable from 5% to 15%. The control will enable re-heat when the space humidity rises above the set point plus the differential.

Reheat operation during periods of vacancy - The control logic contains an unoccupied set point that can be used for periods of un-occupancy if desired. The factory default for the set point is 60% and is adjustable from 30% to 60%. The unoccupied setback must be enabled either through a building automation system or with a user interface. Factory default for unoccupied setback is off.

Space Humidity High and Low Alarm Limits (building automation system only) - The control has a high and low alarm limit that can be enumerated over a building automation system. The factory default set point for these alarm limits is 0% for the low alarm and 100% for the high alarm limit. These limits can be adjusted through a building automation system.

Fan Motor and Assembly

The fan shall be a direct drive centrifugal type with a dynamically balanced wheel. The housing and wheel shall be designed for quiet low outlet velocity operation. The fan housing shall be removable from the unit without disconnecting the supply air ductwork for servicing of the fan motor. The fan motor shall be a variable-speed ECM2 type. The ECM2 fan motor shall be soft starting, shall maintain constant CFM over its operating static range, and shall provide 12 CFM settings. The fan motor shall be isolated from the housing by rubber grommets. The motor shall be permanently lubricated and have thermostatic overload protection. ECM2 motors shall be long-life ball bearing type.

Option: PSC Fan Motor - The fan motor shall be a three-speed PSC type (single speed compressor models only).

Option: High static fan motors shall be available on certain PSC and ECM models.

Electrical

A control box shall be located within the unit compressor compartment and shall contain a 75VA transformer, 24 volt activated, 2 pole compressor contactor, terminal block for thermostat wiring and solid-state controller for complete unit operation. Electromechanical operation WILL NOT be accepted. Units shall be name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 volt and provide heating or cooling as required by the remote thermostat/sensor.

A Premier2 microprocessor-based controller that interfaces with a multi-stage electronic thermostat to monitor and control unit operation shall be provided. The control shall provide operational sequencing, fan speed control, high and low pressure switch monitoring, freeze detection, hot water limit thermistor sensing, condensate overflow sensing, auxiliary heat staging, lockout mode control, hot water and loop pump control, LED status and fault indicators, fault memory, field selectable options and accessory output. The control shall provide fault retry three times before locking out to limit nuisance trips.

A detachable terminal block with screw terminals will be provided for field control wiring. All units shall have knockouts for entrance of low and line voltage wiring. The fan motor and control box shall be harness plug wired for easy removal.

Option: A FX10 microprocessor-based controller that interfaces with a multi-stage electronic thermostat to monitor and control unit operation. The control shall provide operational sequencing, fan speed control, high, low and loss of charge pressure monitoring, freeze detection, condensate overflow sensing, lockout mode control, hot water and loop pump control, LED status and fault indicators, fault memory, field selectable options and accessory output. The control shall communicate all mode, status, fault and lockout codes to the front end system for fast and accurate equipment diagnosis. The control shall provide fault retry three times before locking out to limit nuisance trips.

Optional FX10 microprocessor control communication protocols: N2, LonWorks, BACnet

Optional IntelliStart™ (compressor Soft Starter) shall be factory installed for use in applications that require low starting amps, reduced compressor start-up noise, off-grid, and improved start-up behavior. IntelliStart shall reduce normal starting current by 60% on 208/60/1 units.

Piping

Supply and return water connections (and optional desuperheater connections) shall be 1 in. [25.4 mm] FPT brass fittings fixed to the corner post, which eliminate the need for backup pipe wrenches.

The vertical units, the condensate connection shall be a 3/4 in. [19.1 mm] PVC socket with internally-trapped hose that can be routed to front or side corner post locations.

Engineering Guide Specifications cont.

Hanger Kit

(included with horizontal units only - field installed)
The hanger kit shall consist of galvanized steel brackets, bolts, lock washers, and isolators and shall be designed to fasten to the unit bottom panel for suspension from 3/8″ threaded rods. Unit sizes 009-030 shall include four brackets. Unit sizes 036-072 shall include six brackets. Brackets shall not inhibit filter removal in any way.

Accessories

Thermostat (field-installed)

A multi-stage auto-changeover electronic digital thermostat shall be provided. The thermostat shall offer three heating and two cooling stages with precise temperature control. An OFF-HEAT-AUTO-COOL-EMERG system switch, OFF-AUTO fan switch, and indicating LEDs shall be provided. The thermostat shall display in °F or °C.

Hose Kits – Ball Valves (field-installed)

A flexible steel braid hose featuring Kevlar® reinforced EPDM core with ANSI 302/304 stainless steel outer braid and fire rated materials per ASTM E 84-00 (NFPA 255, ANSI/UL 723 & UBC 8-1). Ball valve at one end; swivel connector with adapter at the other end (swivel to adapter connection via fiber or EPDM gasket). Swivel connection provides union between heat pump and piping system. The hoses feature brass fittings, stainless steel ferrules. A full port ball valve shall be provided with integral P/T (pressure/temperature) port on supply hose. Specifications:

- Temperature range of 35°F [2°C] to 180°F [82°C].
- Max. working pressure of 400 psi [2757 kPa] for 1/2″ and 3/4″ hose kits; max. working pressure of 350 psi [kPa] for 1″ and 1-1/4″ hose kits.

Hose Kits – Automatic Balancing and Ball Valves (field-installed)

A flexible steel braid hose featuring Kevlar® reinforced EPDM core with ANSI 302/304 stainless steel outer braid and fire rated materials per ASTM E 84-00 (NFPA 255, ANSI/UL 723 & UBC 8-1). Ball valve at one end; swivel connector with adapter at the other end (swivel to adapter connection via fiber or EPDM gasket). Swivel connection provides union between heat pump and piping system. The hoses feature brass fittings, stainless steel ferrules. A full port ball valve shall be provided with integral P/T (pressure/temperature) port on supply hose and automatic balancing valve with integral P/T ports and full port ball valve on return hose.

Specifications:

- Temperature range of 35°F [2°C] to 180°F [82°C].
- Max. working pressure of 400 psi [2757 kPa] for 1/2″ and 3/4″ hose kits; max. working pressure of 350 psi [2413 kPa] for 1″ and 1-1/4″ hose kits.
- Minimum burst pressure of four times working pressure.

Hose Kits – Automatic Balancing and Ball Valves with 'Y' strainer (field-installed)

A flexible steel braid hose featuring Kevlar® reinforced EPDM core with ANSI 302/304 stainless steel outer braid and fire rated materials per ASTM E 84-00 (NFPA 255, ANSI/UL 723 & UBC 8-1). Ball valve at one end; swivel connector with adapter at the other end (swivel to adapter connection via fiber or EPDM gasket). Swivel connection provides union between heat pump and piping system. The hoses feature brass fittings, stainless steel ferrules. A "y" strainer is provided on one end for fluid straining and integral "blowdown" valve.. A full port ball valve shall be provided with integral P/T (pressure/temperature) port on supply hose and automatic balancing valve with integral P/T ports and full port ball valve on return hose. Specifications:

- Temperature range of 35°F [2°C] to 180°F [82°C].
- Max. working pressure of 400 psi [2756 kPa] for 1/2″ and 3/4″ hose kits; max. working pressure of 350 psi [2413 kPa] for 1″ and 1-1/4″ hose kits.
- Minimum burst pressure of four times working pressure.

Electronic Air Cleaner (field-installed)

A 1″ [25 mm] electronic air cleaner, cleanable 97% efficiency at 0.3 microns and larger, shall be provided in lieu of the standard throwaway filter. The initial pressure drop across the filter shall not exceed 0.2 in. w.g. at 300 fpm force velocity.

Electrostatic Air Cleaner (field-installed)

A 1″ [25 mm] electrostatic air cleaner, cleanable 90% efficiency, shall be provided in lieu of the standard throwaway filter. The initial pressure drop across the filter shall not exceed 0.15 in. w.g. at 300 fpm force velocity.

AlpinePure MERV 13 Filter

A 2″ thick [51 mm] MERV 13 filter can help fulfill a credit under the LEED Rating System. Its low initial resistance promotes low energy consumption (0.21 in. w.g. @ 300 fpm) and provides nearly twice the life of a standard filter (300 fpm vs. standard 500 fpm application).

4″ Pleated Filter Accessory

A 4″ thick [102 mm] MERV 11 filter and filter rack shall be provided in lieu of the standard filter and rack.

Earth Loop Flow Center (field-installed)

A self-contained module shall provide all liquid flow, fill and connection requirements for ground source closed loop systems up to 20 GPM. The pumps shall be wired to a power block located in the nearest unit. The heat pump units shall contain low voltage pump slaving control so that two units may share one flow center.

Auxiliary Heater (field-installed 208-230V units only)

An electric resistance heater shall provide supplemental and/or emergency heating capability. Vertical units shall have the control box and resistance heater coil assembly mounted internally. For horizontal units, the control box shall be mounted internally while the resistance heater coil assembly shall be mounted externally. A low voltage plug shall be provided in each unit for quick auxiliary heat connection. The heater shall operate in sequenced stages as controlled by the unit's Premier microprocessor. The heater shall feed line voltage power to the unit fan and transformer to provide emergency heat capability in the event of an open compressor circuit breaker.

Desuperheater

An optional heat reclaiming desuperheater coil of vented double-wall copper construction suitable for potable water shall be provided. The coil shall be factory mounted inside the unit. An internal pump is not included. Order DPK4 for field installed pump and temperature limit.

Manufactured by
WaterFurnace International, Inc.
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Fort Wayne, IN 46809
www.waterfurnace.com

Product:	**Envision Commercial Series**
Type:	Geothermal/Water Source Heat Pumps
Size:	0.75-6 Ton
Document:	Specification Catalog

SP1593 7/09

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